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WOOD WORKING Digest

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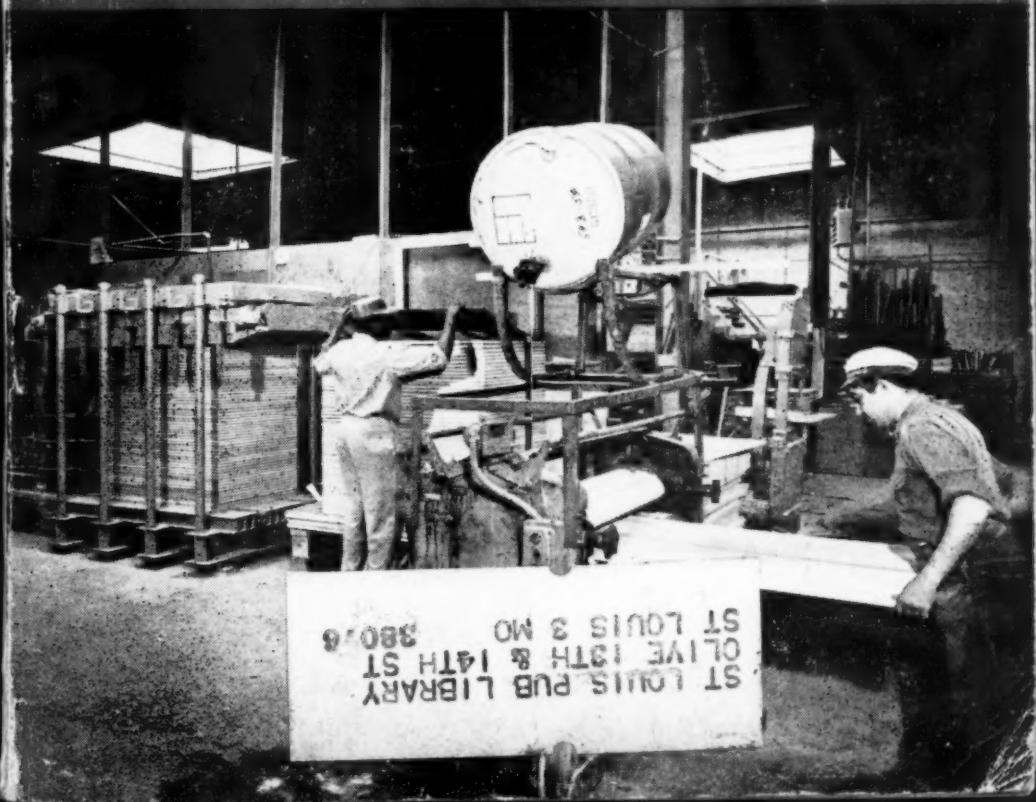

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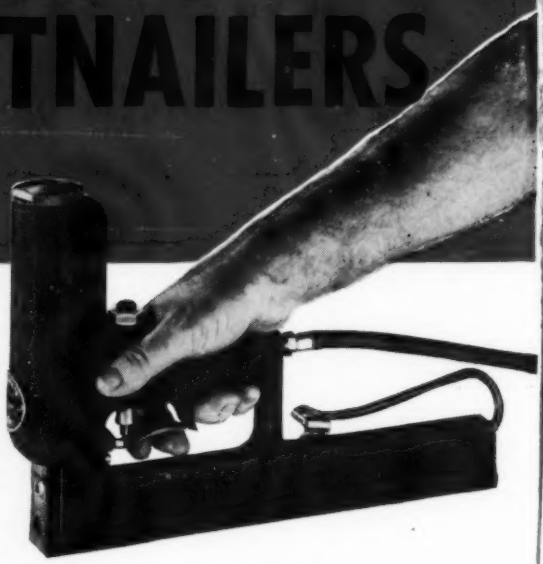
Air Drive

High Velocity Non-Recoil SPOTNAILERS

FIRE LONG FASTENERS INTO HARDEST WOODS with 100 P.S.I. or less



All the heavy duty fastening jobs so ably performed for years by manually operated Spotnailers now can also be done with the super speed and convenience of air.

The new Models PEL and PHL Spotnailers are beautifully balanced tools which may be operated at arms length because no effort is required except to position the gun and operate the trigger — astonishing to those accustomed to using air guns that must be held tightly to the work. It opens up great new opportunities for cost saving fastening.

Most millwork and furniture fastening jobs can be done more profitably with Spotnailers. See your local Spotnail Man. His experience can help you.

- ★ HIGH VELOCITY NO-BOUNCE ACTION
- ★ LOW HANDLE EXCELLENT BALANCE
- ★ LIGHT WEIGHT REDUCES FATIGUE
- ★ DRIVES 16 or 18 GAUGE 1-3/16" LONG FASTENERS
- ★ LARGER, INSTANT-LOAD MAGAZINE HOLDS 200 FASTENERS
- ★ COUNTER SINKING TO SUIT – GUIDE PLATES

No. 99DC
1⅛" Long

DIVERGENT CHISEL POINTS

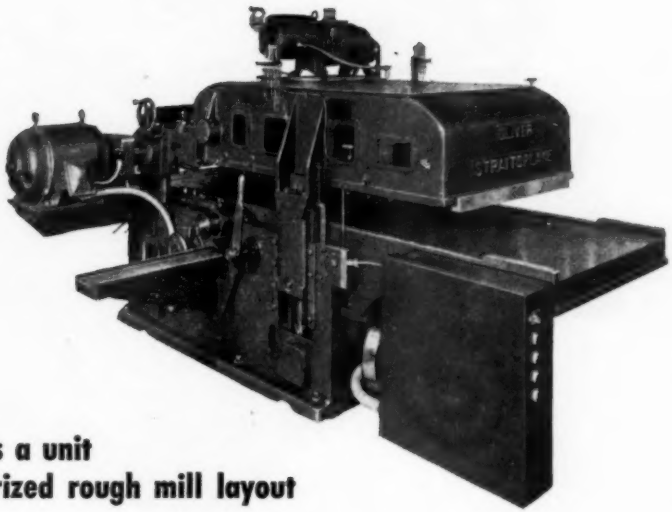
WRITE FOR COMPLETE INFORMATION
SPOTNAILS, INC.
EVANSTON 1, ILL.

HD-9-DC
1⅛" Long

SPOTNAILS, INC.

In one operation

the Oliver Straitoplane planes the raw stock out-of-wind . . both sides smooth and parallel



Unmatched as a unit in a conveyorized rough mill layout

Write for Bulletin No. 170 containing complete information on the Straitoplane

The efficient production of the Oliver Straitoplane is unmatched. It does the work of two buzz planers and one surfacer . . . and does it better and faster!

It planes out as much as ½-inch on each side of the stock at speeds up to 90 feet a minute. The bottom side is face jointed, and top side planed smooth, straight and parallel to the bottom. The finished board or panel is perfectly flat, level and true.

The Straitoplane takes stock up to 8' long, from 1½" to 36" wide, from ½" to 6" thick. It planes pieces as short as 12" when fed continuously, and as short as 16" when fed singly. Used by many leading woodworkers for high production at low cost.

OLIVER MACHINERY COMPANY

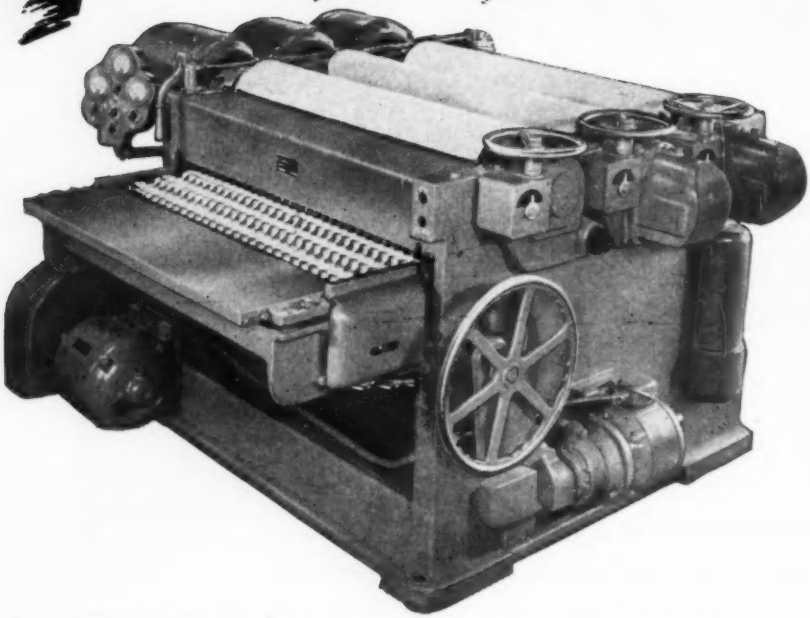
Established 1890

GRAND RAPIDS 2, MICHIGAN

THE SMITH

ENDLESS BED SANDER

WITH SELF-OSCILLATING DRUMS AND VARIABLE SPEED DRIVE, 12' TO 35' PER MINUTE



Self oscillating mechanism, quarter inch stroke, 144 strokes per minute.

An exclusive feature found only on the **Smith** machine.

An example of the tradition of building only the **best in** woodworking machinery **for over 108 years.**

There are many other exclusive features built into the **Smith 2, 3, and 4 Drum Endless Bed Sanders** that **you** should investigate.

Just write and say "I want more information about the **Smith Endless Bed Drum Sanders** and tell me about your **lease plan** also".

WOODWORKING MACHINERY · MANUFACTURERS ASSOCIATION · WMMA

H. B. SMITH MACHINE CO.

SMITHVILLE

BURLINGTON COUNTY **NEW JERSEY**

WOOD WORKING Digest

OCTOBER, 1955
Vol. 57, No. 10

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BPA

SPECIFY

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all steel SWING CUT-OFF SAW

These features speed production, cut costs in building construction, maintenance woodwork, lumberyards, crate and box making, pattern making:

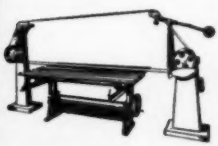
1. **Exclusive Beach "quick swing return"**
2. **Accurate, clear vision cutting control**
3. **Right or left hand cutting**
4. **Guaranteed square cutting**
5. **Special woodworking motor—available in 4 power ratings 3 HP—5 HP—7½ HP—10 HP**

WRITE TODAY for complete information and specifications of the Beach Swing Cut-Off Saw.

$475 F.O.B. Factory

Complete with built-in motor

BEACH MANUFACTURING CO. MONTROSE, PA.



Hand Block Belt Sander

Shaper

WALTERS automatic handling has paid off for . . .

With labor approaching materials as a factor in manufacturing cost it is more important than ever before to use manpower **only where manpower is needed.**

Walters automatic materials-flow systems replace expensive labor with consistent, never-tiring machinery . . . **cutting production cost to the absolute minimum.**

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MORRISTOWN, TENN.

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Address_____

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By_____

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WALTERS MFG. CO.

Tapered Design Detachable Spindles Give You Greater Precision Work!

Here's a shaper especially designed for large volume production of wood mouldings and irregular contours.

The new Dependable S-10 Shaper, **with spindle speeds up to 15,000 RPMs,** produces with maximum accuracy and speed—the finest rabbeting, grooving and routing for furniture and similar woodworking plants.

The New Dependable Shaper is equipped with a tapered detachable spindle 6" long by 1⅛" diameter.

New, tapered design assures a true running spindle, free of vibration at all speeds. Fast, accurate changes in setups take only minutes by changing entire spindle unit instead of heads. Extra tapered spindles of all sizes are available.

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RESILIENT ROLL BALL BEARING GLUE SPREADER

✻ **BLACK BROTHERS have built more resilient roll glue spreaders during the past fifteen years than all other manufacturers.**

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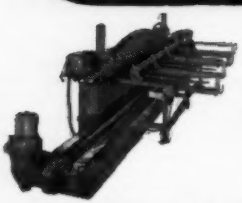
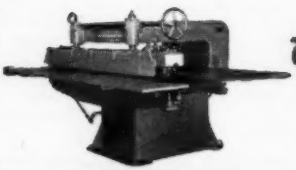
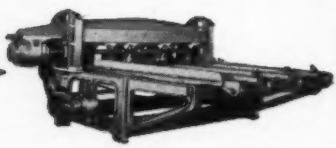
MEREEN WOODWORKING



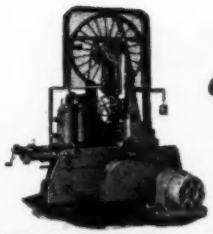
VENEER JOINTER — Traveling head eliminates shifting. No chain feed, no stock wobble. Perfectly joints bundles of veneer up to four inches thick. Sizes from 90" to 212". *Described in M-J Jointer Bulletin.*



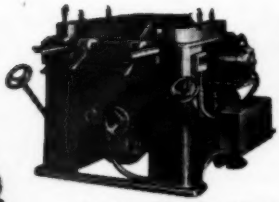
VENEER SPLICER—Makes precision tapeless joints. Adjusts automatically for varying thicknesses of veneer. Welded steel frame with 49" throat clearance at right. *Bulletin No. 50.*



No. 435-H MULTIPLE CUT-OFF SAW—Cuts long boards into short pieces . . . square cuts large sheets . . . cuts any number of grooves. An excellent plywood sizer. *Described in M-J Bulletin No. 435-H.*



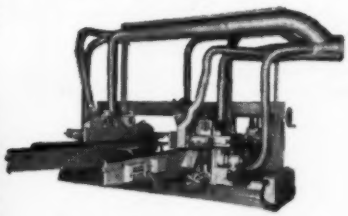
VERTICAL BAND RESAW—Eight feed rolls eliminate stock wobble. 54" Twin Band Resaw. Combination band, rip resaw. Sizes 48" to 60". *Described in Resaw Bulletin.*



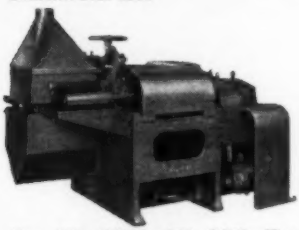
No. 326 MATCHER JOINTER—For sash and door, furniture, box factories and many special applications. Adaptable for jointing hogshead staves. Unequalled for "T" and "G" work. *Bulletin No. 326.*

No. 442-MT COMBINATION SAW—Versatile machine for ripping, cross cutting, grooving, dadoing, beveling, mitering. Cuts up to 48" wide and rips up to 50" wide. Handles large stock easily. *Described in Bulletin No. 442-MT.*

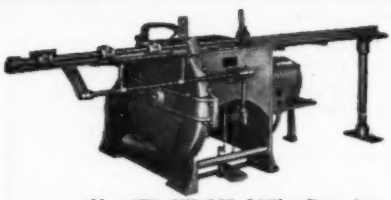
JOHNSON MACHINERY



No. 400 DOUBLE-END TENONER—Sizes up to 20' to fit your requirements. Will square-cut up to 96" ahead of trim saws. Accessories expand its usefulness. *Described in Bulletin No. 400.*



No. 441 GANG RIP SAW—For highest production on the toughest gang ripping jobs. Six power driven feed rolls—12", 19", 24" saw spacing . . . up to 125 HP . . . variable feed drive up to 300 FPM . . . glue joint accuracy. *Described in M-J Bulletin No. 441.*

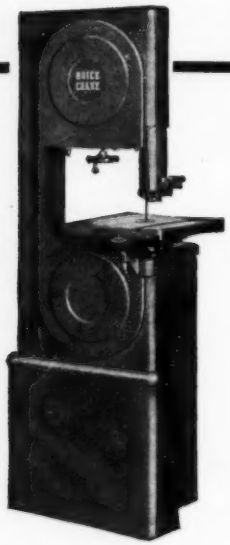


No. 477 CUT-OFF SAW—Capacity equals two or three swing, straight line or roller carriage cut-off saws depending on type and condition of stock. Excellent for box work. *Bulletin No. 477.*

No. 600 DOUBLE CUT-OFF SAW—Accurate production at high feeding rates. Time and labor saving attachments include cope motors, dado arbors and other devices for specific needs. Larger sizes available. *Described in Bulletin No. 600.*

Up to 400% Faster Cutting

...accurate, smooth cuts that reduce sanding by half!



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- ★ 13½ inches, blade to guard, permits 27-inch diameter work. Guide to work table: 7¾".
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- ★ 12 models — single speed and 8-speed backgeared, with or without floor stand.

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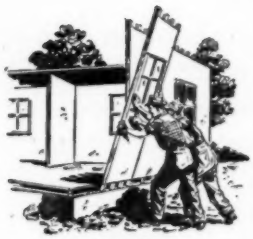

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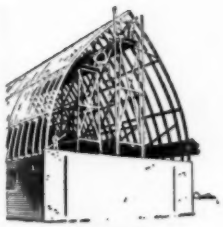
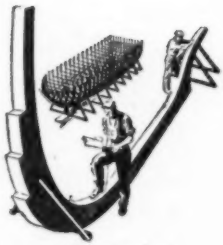
Prefabrication Panels



Stronger
Barn Rafters



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Tougher
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...And all are more durable because they are bonded with PENACOLITE® ADHESIVES

Good properties of Penacolite Resorcinol Adhesives make them just right for the types of wood bonding jobs shown here. And the woods they bond *stay* bonded in spite of age or long exposure.

Penacolite bonds are completely waterproof, and remain as strong as the woods they join through all kinds of temperature changes. Furthermore, they withstand the shrinking and swelling of wood due to rain, sun, heat or cold, and are unaffected by exposure to greases, oils and most solvents.

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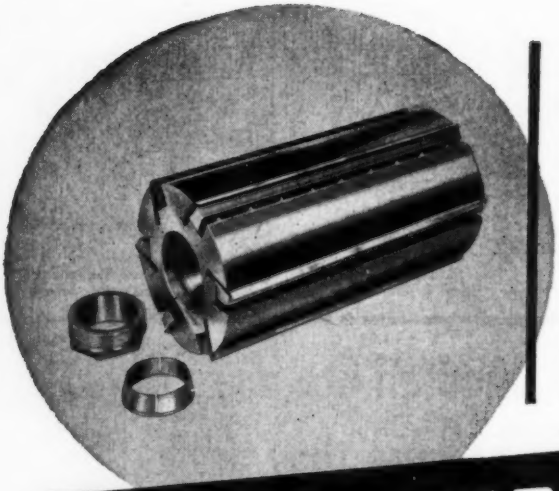
The original waterproof, room-temperature-setting adhesives



Precision in manufacture and careful heat-treating of the material insures accuracy of performance in these heads. For consistent uniformity and reliability, be sure to buy . . .

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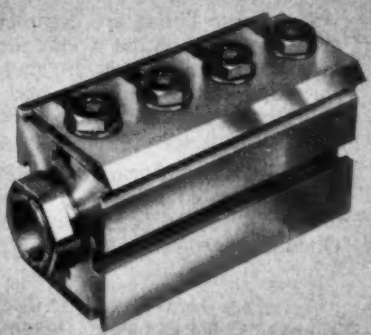
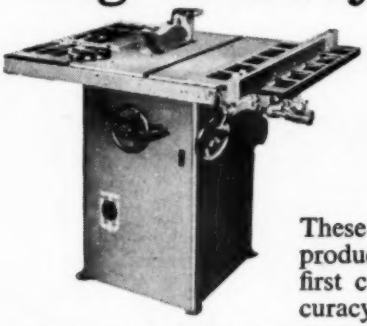


MACHINERY AND TOOLS SINCE 1904

ECCO

These **NEW** Walker-Turner "Light-Heavyweights" give you



BIG MACHINE PERFORMANCE at LOWER COST

These rugged new saws slice right through your production costs . . . start earning their way the first cut you make. Here's performance and accuracy you'd normally find only in much heavier, more expensive machines.

Faster, smoother production cutting is built right into these new Walker-Turners! Motor mounting and arbor *tilt as a unit*. Guard and splitter are always lined up with the blade for protection at any angle. Saw arbors mounted on precision ball bearings on all models.

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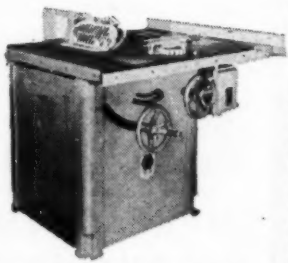
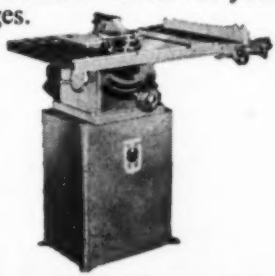
No. 2221 — 10" Tilting Arbor Saw — Capacity: 3⅛" with 10" blade; 2⅛" at 45°; with 6" dado, 1⅛". Speed: 3800 rpm. Table: 32½" deep x 32" wide; 32½" x 45¾" with extensions. With 10" combination blade, extension tables, miter gauge, guard, splitter, motor pulley and belt (without motor) $297.00.



No. 2450 — 14" Tilting Arbor Saw — Capacity: 5" with 14" blade, 3½" at 45°; with 8" dado, 2". Speed: 3450 rpm. Table: 38¾" deep x 48" wide with extension. With 14" combination blade, extension table, miter gauge, splitter, guard, including 5 hp 220/440 volt 60 cycle 3-phase motor, with push button station. $946.50.



No. 2121 — 8" Tilting Arbor Saw — Capacity: 2⅝" with 8" blade, 1½" at 45°; with 6" dado, 1⅝". Spindle speed: 4000 rpm. Table: 23" deep, 19" wide; 23" x 37" with extensions. With 8" blade, extension tables, miter gauge, guard, splitter, belt, motor pulley and sub base (without motor) $192.00.

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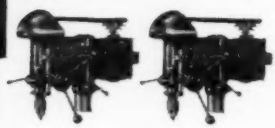
2 Atlas DRILL HEADS



+ INGENUITY =

800% INCREASE IN PRODUCTION

With a little imagination, two ATLAS drill press heads (cost $72.00 each), two Mead air cylinders and a Mead Cycle Box, Chief engineer Pete Tuttle designed this unique set-up for the Steger Furniture Co., Steger, Ill. It automatically feeds, drills, countersinks and ejects TV cabinet corner blocks at the rate of 80 holes per minute . . . replaces two full-time employees . . . and increases production 800%. The operator simply fills the hopper.

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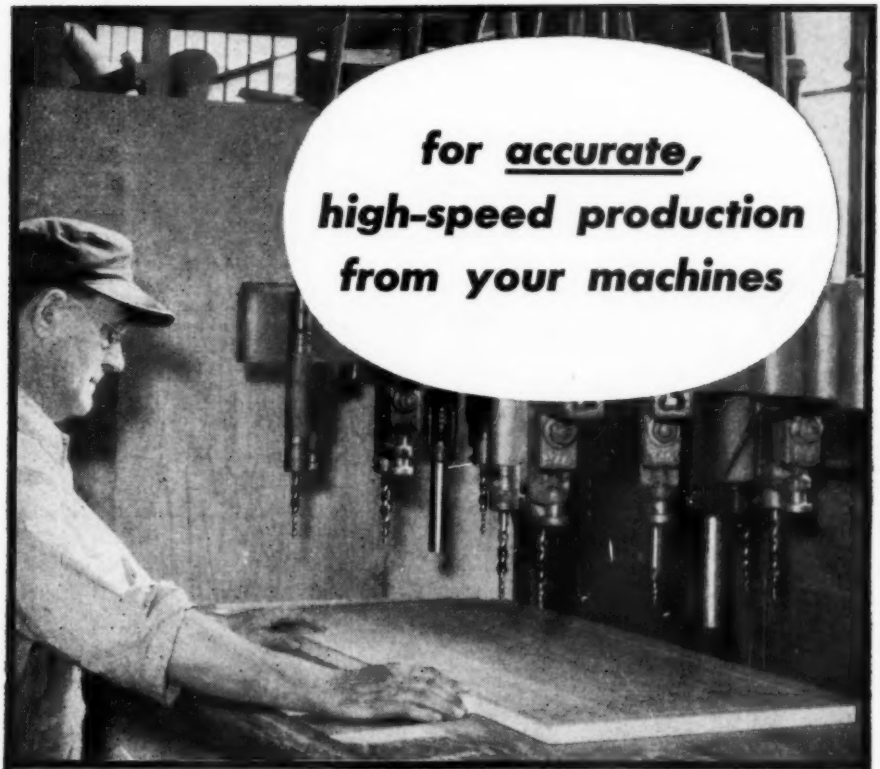

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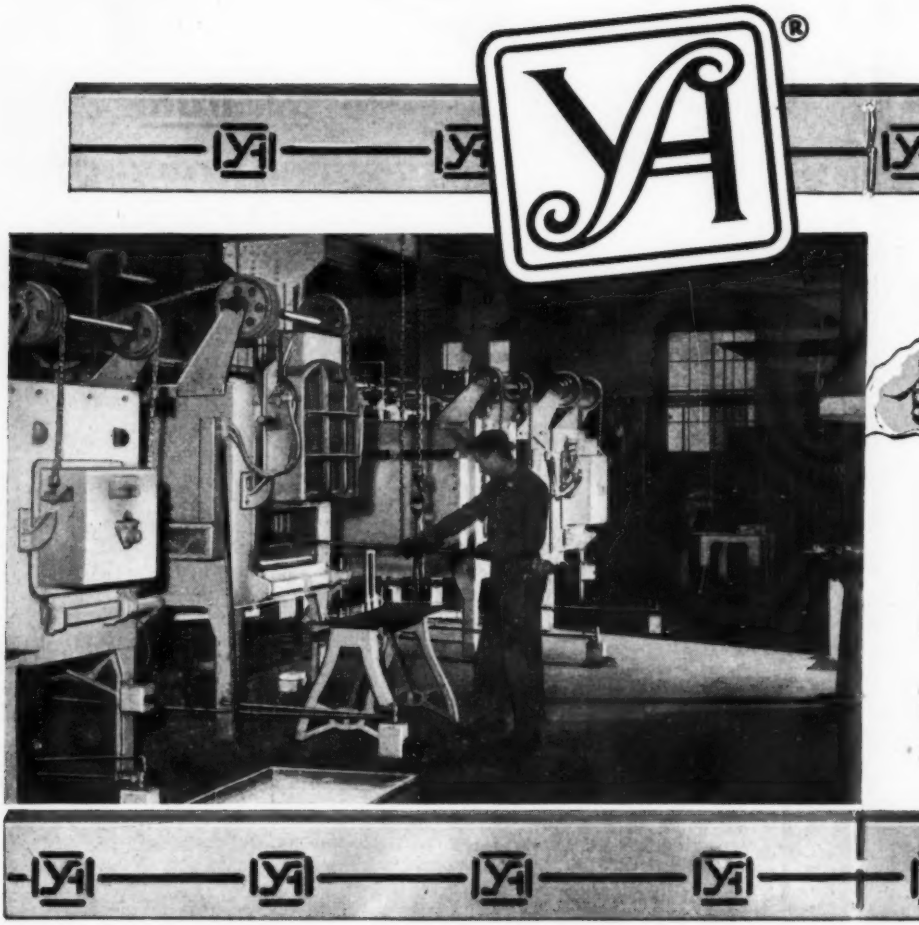

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split seconds

to give you an edge in thin knives

Ordinary heat-treating is not enough to insure the high quality you get in Yates-American Thin Knives. It takes heat-treating that's *timed to the split second* in atmosphere-controlled furnaces.

It takes more, too!

It takes know-how born of experience in all phases of manufacture. Yates-American has been making knives for 73 years.

There's know-how behind the way Yates-American grinds thin knives so that they stay sharp longer between grinds. Know-how helps Yates-American provide the steel you need for your feed and speed.

And there's know-how behind the way Yates-American packages its thin knives. They're covered with an airtight, waterproof coating of plastic — safe against rust, corrosion, and damage to cutting edge.

Are you using Yates-American Thin Knives?

In woodworking plants everywhere, planers, matchers, shapers, milled bits, and moulders handle more board feet between grinds, because they're equipped with Yates-American Thin Knives. Make them *your* standard, also.

Have special needs?

If you have special requirements in knives, send us blueprints and specifications for quotations.

Tear out coupon and mail **Today!**

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Walter of Wabash

MAKE 30 PROFITABLE PARQUET BLOCKS PER MINUTE from salvagable trim stock on this NEW SARANAC

Automatic Hopper-Feed PARQUET BLOCK MACHINE

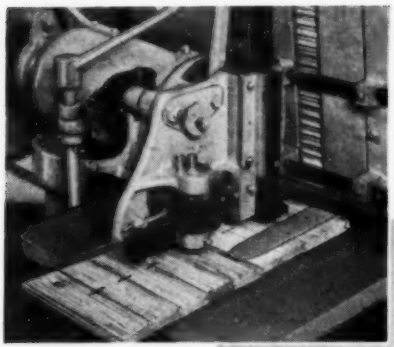


Fig. 3442

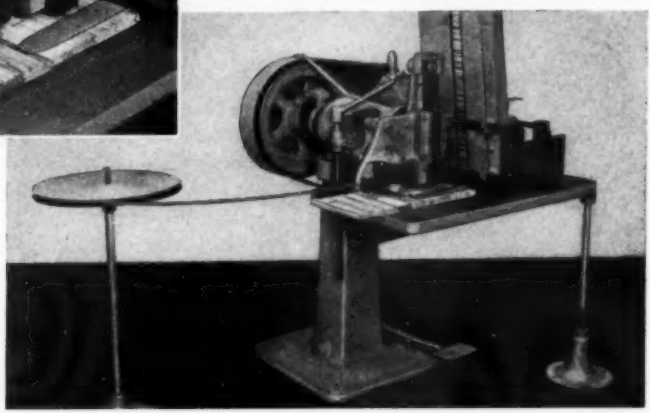


Fig. 3440

Here's the *profitable* answer to a former waste-product *problem!* Using salvagable trim stock, you can produce up to *thirty* 6¾" x 6¾" parquet blocks per minute—or 9" x 9" (four board) blocks at 22½ per minute with one operator.

Specialized for high production, this *new* Saranac Automatic Hopper-Feed Machine drives a sturdy corrugated fastener to link boards together—and automatically skips the space between blocks.

Floor layers *prefer* these blocks for easiest laying. There's no spline to cut off, and boards are quickly separated without need for a hacksaw. With corrugated fasteners, blocks also readily adjust to slight subfloor irregularities.

Machine is adjustable to produce blocks from 6¾" to 13½" square . . . from 25/32" to ½" thick . . . and can be connected to a conveyor or directly to the infeed of equalizer and tenoning machine. A squeezing device clamps boards together while fastener is driven.

Use your trim stock for profits! Write today for Parquet Machine data and prices!

SARANAC MACHINE COMPANY
BENTON HARBOR • MICHIGAN

Manufacturers of the World's Largest Line of Fastening Machinery

VMT Dovetail Bits in continuous operation for 1,215 hours traveled 42.12 miles cutting 405 thousand 9-ply plywood drawer fronts . . .

A set of VMT Tungsten High Speed Steel Dovetail Bits in a new model 15-spindle Wysong and Miles dovetailer at the David M. Lea & Company, Inc. plant, Richmond, Virginia, established a performance record hard to beat.

Ordinary dovetail bits last from six weeks to 3 months requiring sharpening 2 to 4 times a week and sometimes as often as once a day which means constant change in size of cut.

These VMT bits at the David M. Lea plant were in continuous operation, 9 hours per day for 6 months and 5 days (equal to 1,215 hours and a distance of 42.12 miles) cutting a total of 405 thousand 9-ply plywood drawer fronts. This is tough cutting and calls for some mighty clean and exacting cuts. Sharpening was only required every 2 weeks which meant infrequent change in size of dovetail cut.

Here's performance for big savings in production costs — and can mean the same in your plant, too. Why not check the advantages of VMT cutting tools — precision made — milled to pattern and standard line for every woodworking job.

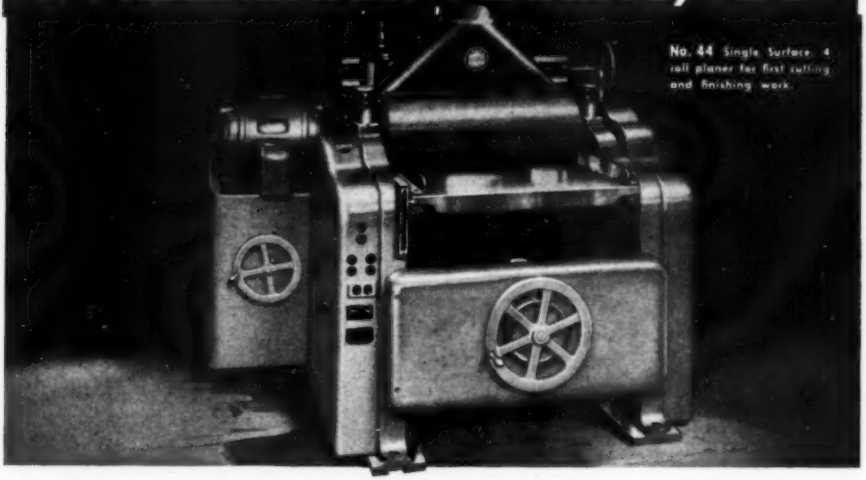
Write, wire or phone us today. Ask for our new catalog—giving you complete details on all VMT woodworking tools.

Virginia MACHINE TOOL CO.

BASSETT, VIRGINIA

Precision Made Tools For The Woodworking Industry—Standard or Milled to Pattern

The BEST FINISHING PLANER is one that does the best job of PRELIMINARY PLANING, TOO!



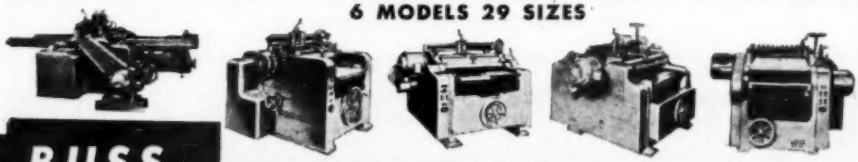
No. 44 Single Surface, 4 roll planer for first cutting and finishing work.

ONE BASIC REASON FOR THIS is that the strategically located extra weight and strength which permits a planer to do an outstanding job of preliminary planing, with its greater strains and stresses, also provides the added stability so necessary to obtaining the finest finish planing.

Wherever it will contribute to greater accuracy, strength and stability BUSS planers are given extra size and weight. Frames are much heavier than competitive machines. Tables are wider and heavier. Table raising wedges are heavier and approximately 40% wider. Girts are thicker and heavier. Roll boxes are 50% longer. Cutterhead bearing housings are central over the frame. One piece grinding rail permits grinding knives within a fraction of a thousandth inch. The greater stamina thus achieved and their many exclusive, semi-automatic controls have made BUSS planers not only the finest of machines for preliminary planing but also the best to be had for finished planing. Write for bulletins and judge for yourself.

THERE'S A BUSS PLANER TO EXACTLY SUIT YOUR NEEDS

6 MODELS 29 SIZES



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Recent issues of THE GLUE LINE have carried articles on a wide variety of subjects including: Glue Selection, Glue Handling & Storage, High Frequency, Moisture Content Detection, Moisture Control, Hardwood Plywood Imports and similar topics.

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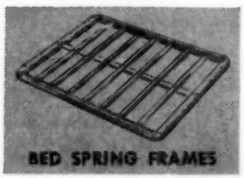
Many of the problems of industrial nailing which are troublesome to you today, may have already been successfully studied and solved by FMC nailing machine design and application engineers.

Problems arising from countless combinations of woods, materials, nailing patterns, speeds, space, manpower, pressures, feeds, mechanics, hydraulics and other variables have been resolved by our engineering department. From hundreds of case histories FMC can counsel with you on all phases of automatic nailing.

Hand us your nailing problem. We believe we can give you a successful FMC answer to it from the scores of types, sizes and models of FMC nailing machines which have been built and are in successful operation by firms like yourself—who once also had a nailing problem!



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L-O-N-G on quality!

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Standard of Comparison in the Woodworking Industry

CUTTER DIVISION

Diehl

Let's Get Results

E. McDaniel
Editor

The experts have said that business will be good for the next six months! The Christmas season will reflect higher sales. Home ownership is up 33% in the last ten years.

These are good signs, but they are also danger signs. Dangerous in that they may lull us into a sense of false security.

Perhaps such phrases as "the future belongs to those who prepare for it," etc., take us back to high school days. However, the things we learned "by rule of the hickory stick" often hold true in adult life.

Along with the encouraging signs, let's sound a few notes of warning: Prefab home manufacturers are being told to vary exterior of homes and use more metal; metal kitchen cabinet manufacturers have entered the competitive market with renewed spirit; results of a little personal study show wood articles are consistently higher priced than metal or plastic.

The future does belong to those who prepare for it. Here are a few of the things we believe need to be done:

1. Give the best publicity possible to every project concerned with our industry—from opening of tree farms (incidentally, Illinois is soon to be the 39th state in this program) to new plants and new products.

2. Help the folks who sell our products with advertising. This does not mean paying their bills, but giving them plenty of factual information as to why they should push the "Jones" line. More help is needed in training those who sell to the consumer. Getting an order is not enough. Have your salesmen get the order, but in addition help the customer sell the product with training aids and promotional material.

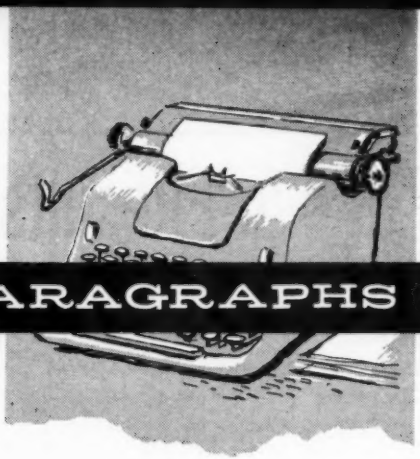
3. Surely there are many furniture manufacturers, wood door and window manufacturers as well as others who could afford to do some advertising in ways to reach the consumer. Educating the public helps you as much as the dealer who handles your product.

4. If you can't afford research departments, at least have your executives spend some time thinking about product improvement.

5. Carefully go over your whole cost system. You may need some outside help on this. A later issue of WOOD WORKING DIGEST will carry articles on right "costing and pricing."

6. Encourage employee morale. Is your plant really a team pulling together with the feeling that all America needs your product? How can you get this spirit into your plant?

7. Drop us a line if you have some ideas as to how the woodworking industry can grow with the future.



POINTED PARAGRAPHS

A cheap wood fibre building board that filters poison gas, disease laden particles, and the radioactive fall-out of atomic explosions from the atmosphere has been developed. Information is available from the U. S. Forest Products Laboratory, Madison 5, Wis.

Ponderosa Pine Woodwork has absorbed the American Wood Window Institute, formerly located in Dallas, Tex. A stepped-up "seal of approval" program for double-hung window units has been initiated as a result of the absorption.

October 3, 1955 will be the formal opening and dedication of the National Housing Center, 1625 L St., N.W., Washington, D.C. The center has been established as a display center for housing aids and also contains an exhaustive reference library. When in Washington, be sure to spend some time there.

Furniture manufacturing business will continue good during the final months of 1955, although higher prices, due to increased production costs, may slow activity. See this issue of WOOD WORKING DIGEST for a report on the N.A.F.M. meeting and fair where these views were expressed. Next year this fair will be held August 26-29, 1956.

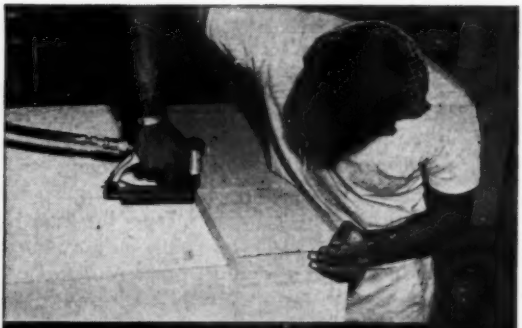
The November issue will bring you details on the A.S.M.E. meeting, wood products section, to be held in Chicago during the middle of November. The Forest Products Research Society is planning a meeting for this same week. Both groups will be discussing chipboard manufacture.

As we go to press, we are approaching "Home Fashion Time," September 28-October 4. This should be a big boost to the furniture industry and promote sales in the entire home furnishings field. Newspapers, magazines, radio and TV will all be featuring the event.

Save Time Save Money

use

DUO-FAST automatic TACKERS



DUO-FAST AIR TACKERS cut production costs on case backs, drawer guides, and numerous other jobs.

MORE WORK, in less time, using fewer workers—that's the story on Duo-Fast Automatic Tackers and Staplers.

WIDELY USED in cabinet and woodwork shops, furniture plants, sash and millwork factories, toy makers, for a wide variety of fastening jobs.

A COMPLETE LINE of AIR TACKERS, HAMMER TACKERS, GUN TACKERS, STRIKE TACKERS, and AIR STAPLERS, including the model to save you time and money.

DUO-FAST GUARANTEE assures you of free service on Duo-Fast machines. An important money-saving feature.

DUO-FAST HAMMER TACKERS speed and simplify many tacking jobs. One-hand operation.

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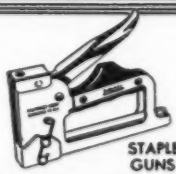
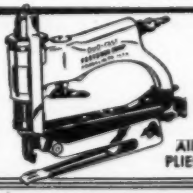


STAPLE GUNS

STRIKE TACKERS



AIR PLIERS

FASTENER CORPORATION

858 Fletcher Street • Chicago 14, Illinois

We quote this valuable information from the "Veneer News Letter," which some of our readers may receive regularly.

> **"Be sure to label woods accurately! The Federal Trade Commission's new trade practice laws, designed to protect the consumer from being deceived by imitation materials resembling genuine hardwoods, will be rigidly policed.**
> **"Help in describing the composition of wood furniture, radio and television cabinets comes from the Fine Hardwoods Assn. which has clarified the FTC rules for manufacturers as follows: (1) if exposed lumber structural parts and flat plywood surfaces are of the same wood, the item may be labeled 'Genuine' i.e., 'Genuine Mahogany'; (2) if exposed structural parts and flat surfaces are all lumber of the same wood, the piece may be labeled 'Solid' i.e., 'Solid Walnut'; (3) if exposed flat surfaces and structural parts of an item are composed of two or more woods, the name of each wood should be shown on the label i.e., 'Mahogany with Gumwood structural parts' or 'Mahogany and Gumwood'; (4) if any portion of the exposed surfaces of a piece is imitation rolled grain (whether on lumber, plywood, hardboard or other material) the label should so indicate i.e. 'Imitation Oak Grain on Plywood.' A folder explaining how to apply the FTC rules is available from the Fine Hardwoods Association, 666 N. Lake Shore Dr., Chicago, Ill."**

The various hurricanes have left tragedy and almost insoluble problems among smaller businesses in the east. The great aftermath of the flood is the mountain of mud under which small plants, shops, stores, streets and homes lie buried. The New England Council and Connecticut Development Commission, together with government units and trade organization groups, have been working in the areas.

Commodity Standards Division of the U. S. Department of Commerce has announced a recommended Commercial Standard for Standard Stock Wood Awning Windows and Awning and Stationary Sash Units. It is identified as TS-5273 and is available by writing to H. A. Bonnet, Commodity Standards Division, U. S. Department of Commerce, Washington 25, D. C.

The Small Business Administration has been given two more years of life by Congress with the authority to raise its ceiling on individual loans from $150,000 to $250,000. In its recent report SBA told the President small business is doing much better and shares to a greater extent in the national prosperity, and predicted a sharp increase in small business in the immediate period ahead.

Among the events scheduled for October are: National Hardwood Lumber Association, Chicago, 11-13; National Retail Lumber Dealers Association sponsors Materials Handling Clinic, Cleveland, 11-14; National Safety Council, Chicago, 17-21; and the National Motel Show, Chicago, 24-25.

THERE IS ONLY ONE GLU-BOND*

*SWIFT'S POLYVINYL RESIN ADHESIVE IS AS DISTINCTIVE AS A FINGERPRINT

A decade of outstanding performance on all types of wood, predated by many more years of careful research and testing has established Glu-Bond's reputation as a leader in the wood-bonding industry.

Why speculate with just any polyvinyl adhesive? Write for details on Swift's *proven* Glu-Bond and remember . . .

ONE TRIAL IS BETTER THAN A THOUSAND CLAIMS

Authoritative Data on Polyvinyl Adhesive

A report on tests conducted by Elmendorf Research Inc. on polyvinyl resin adhesives is available upon request. Write to Swift & Company or to Elmendorf Research Inc., 322 West Washington, Chicago 6, Ill.

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MANUFACTURERS OF SWIFT'S GLU-BOND POLYVINYL RESIN ADHESIVE

Comments

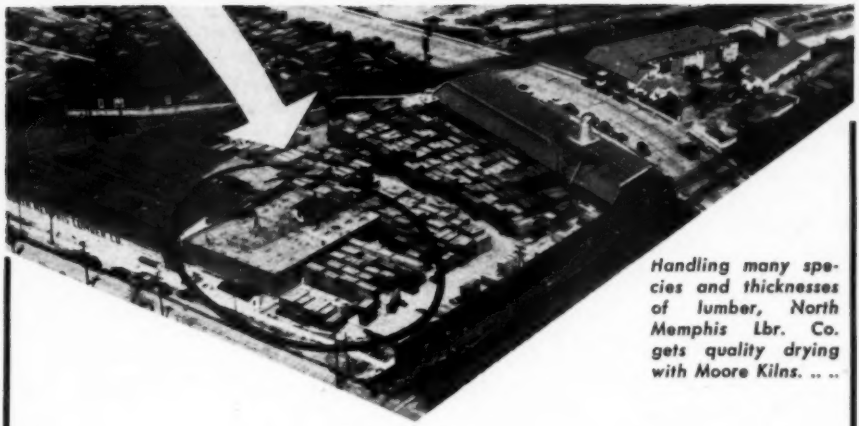
FROM THE NATION'S CAPITAL

Frequently, the Federal Reserve Bank Board has a meeting in its marble palace at which the economic and financial affairs of the nation are surveyed. Different groups of wholesale and retail distributors, as well as manufacturers, and service organizations, are invited to send representatives to the quiet and little-known gatherings. The gatherings are never very large; they are notable because of their extraordinary representative character.

Recently several meetings have been held there at which the Treasury, Federal Housing Administration, Veterans Administration, Office of Defense Mobilization, Department of Commerce, General Services Administration, Housing and Home Finance Agency, Department of Defense, and other Federal units concerned with consumer credit were the participants together with different representatives of non-Government groups from all parts of the country. The meetings were of interest to every businessman in the United States—in fact, to every citizen in the United States-because the informal conclusion reached by these people was that consumer credit was in a sound position but should be carefully watched in order that there might not be a sudden runaway inflation. For instance, Mobilization Director Flemming came away with the idea that mild warnings should be given that incentive tax benefits probably were being spread around too generously and too promiscuously.

Secretary of Commerce Weeks suggested that businessmen, and others should "keep their feet on the ground and employ simple common sense." He particularly warned against "exaggerated market speculation and expansion of dangerous credit inducements." This wise man from Massachusetts emphasized that the gross national product-the estimated value of goods and services in this country-was at the rate of $385,000,000,000 for the second quarter of 1955. This was an absolutely new high record. For the first quarter it was $375,000,000,000, and for the same period last year it ran under $385,000,000,000.

Secretary Weeks had previously announced that employment in July totaled approximately 65,000,000 persons as compared with a previous high of 63,691,000 in August, 1953. In May and June



Handling many species and thicknesses of lumber, North Memphis Lbr. Co. gets quality drying with Moore Kilns. .. ..

Why Do Leading Custom Drying Plants Depend on Moore Kilns?

It's no secret that custom drying plants—where QUALITY DRYING and CONTROLLED COSTS are watchwords the year round—prefer the proven Moore Cross-Circulation Kiln.

There are definite reasons for this preference:

More cubic feet of air per H.P. is produced by large multi-blade Moore Fans, turning slowly. Only one motor and drive located outside kiln operates entire fan system. All fans turn at identical speed, delivering identical volume of circulation.

Where Results Count, Choose Moore

MOORE DRY KILN COMPANY

Oldest and Largest Manufacturers of Dry-Kilns and Veneer Dryers

JACKSONVILLE FLORIDA | BRAMPTON, ONT. CANADA | VANCOUVER, B. C. CANADA | NORTH PORTLAND OREGON

of this year personal income was at an annual rate of $301,000,000,000 compared with $288,900,000,000 in July and October, 1953.

The Secretary, who obviously spoke for most of the Government, emphasized "over-confidence can be as hurtful as a lack of confidence, and speculation can be worse. Businessmen must watch their inventories. Construction, housing and plants, must be related to legitimate demands.

"We must all realize that exaggerated market speculation can induce a headache instead of a healthy economy. A high quality of credit is vital at all times. Personal debt is legitimate and proper and has a recognized place in our private enterprise scheme of things. But when I pass a second-hand auto dealer's lot and see good-looking cars for sale with a $5-down sales tag on each, I wonder that businessmen can reason their proceeding on the basis of sound business practice."

Early in September Mr. Weeks modified these unequivocal statements thus:

"Prosperity is unprecedented. Let's keep it on the rails. Let's not do anything to spoil it.

"In a growing economy, approximately 66,000,000 Americans are working today and many of them working for private enterprise who formerly worked for Government.

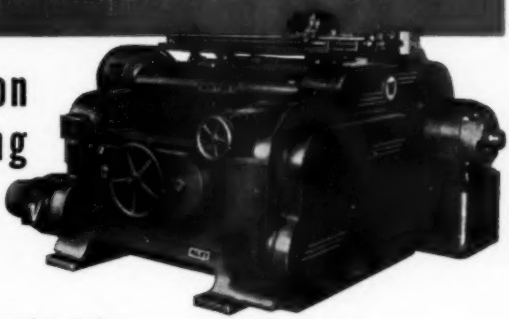
"This economy of ours runs to a great extent on the fuel called 'confidence'. People continually ask me as to the future. I am no prophet but one need not be a prophet to have confidence that this fast-growing nation can continue to nourish a fast-growing and prosperous economy. I would point out, however, that while Government can help, the larger share of responsibility must rest in the hands of the men who operate the business—and I wish to emphasize the little as well as the big—of this country.

"Overconfidence can be as hurtful as lack of confidence, and speculation can be worse; businessmen have to watch what they are doing."

Both Government and private economy today, in Washington, constantly emphasize with honest astonishment that automobiles outsell anything on the market on a credit basis. They tell us it is the first time that the auto leads the consumer credit list. Both Government and private sources explain that the people still have more savings than they have committed for consumer credit. We hear on all sides that they are getting better pay, that more of them are employed—Labor Department says actually only 700,000 are unemployed—and there are many expenses they had to meet in the past which now either are met for them or are partially defrayed by their employers or by Government or by other collective sources. It is pointed out that practically every important fixed outlay, such as health insurance, old-age insurance, and many other kinds of insurance, and other demands upon the individual or his family, which he had to take out of a much smaller pay envelope 25 to 30 years ago, are now wholly or partly paid for him in other ways. Thus, naturally, the average individual and his family are said to have the assurance

Nothing Compares with the WHITNEY 97 DOUBLE SURFACER

For quality production and low cost planing



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Widths, 30" 36" 40" and 44"

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in their minds that they have relatively considerable more money to spend and can make consumer credit commitments with freedom to themselves and reasonable safety to the business community and the financial institution which are concerned with their lives.

We are told at the very least one-third of the actual population of the United States, and well over one-half of those who are employed in one way or another, own property. It is responsibly estimated there are more than 50,000,000 property owners in this country most of whom own their homes. And to further increase their economic substantiality it is proposed that a certain defined irreducible percentage of the value of a home shall be available to its owner to reduce the amount of taxes that he may owe the Federal Government.

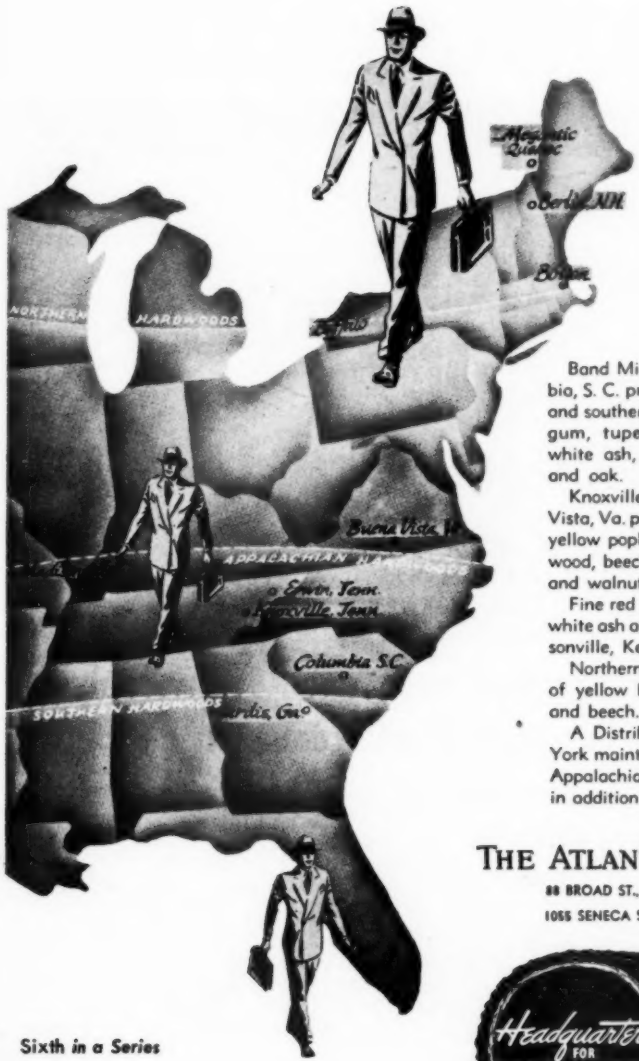
The National Foundation for Consumer Credit, regarded in Washington as one of the two most important national organizations dealing with consumer credit, tells us: "It's untrue, there is not too much credit in our economy. There is no need to curb instalment buying. Consumers do not owe anything like $33,000,000,000 on installment debt—the figure that is always featured. Nor do they owe for consumer purchases and services anything like $25,500,000,000. In 1954 disposable income stood at $254,000,000,000 and installment outstandings were 8.9 percent of that figure. The current relationship of outstanding disposable income at mid-year 1955 was essentially the same as that recorded for 1954.

Over 57% of American families currently do not owe a penny for instalment debts. A considerably higher proportion owing instalment accounts today are in the middle-and upper-income brackets higher than those earning $3,000 a year or less. So far in 1955 new instalment commitments have outpaced slightly repayment–due almost entirely to buoyance of automobile sales. We know only 7% will run more than 24 months. Although consumer credits outstanding have reached an all-time high–retailers are keeping their bad debt losses to one-half of one percent. Remember we have had a terrific population increase; the record 60,000,000 persons employed in the United States; the 40 percent rise in earnings of the typical American family; the increase of take-home dollars over the rise in the cost of living index; and the personal liquid assests of $220,000,000,000, an all-time high, are extraordinary factors. Under the circumstances, it would be odd if consumer credit outstandings were not at their present high record. There is irrefutable evidence the people are not 'head-over-heels' in debt—with no buying power left to effect any downturn in business–should that occur. The surest way to start the business cycle downward would be enactment of Federal regulations to restrain and reduce the sale of goods and services to sound, worthy credit buyers."

Last year within the United States the Federal Government employed 15% of all workers. Over 17% of all personal income was received via Government–State, local and national.

The Federal Trade Commission recently charged the Paint Dealers Institute of New York City and five member associations

Wherever you are . . whatever you want . .



COMPLETE FACILITIES in all principal producing areas assures you the wood you want, when you want it, in the quantities you want, through your Atlantic Man.

Band Mills at Sardis, Ga. and Columbia, S. C. provide red cypress, yellow pine and southern hardwoods like red and sap gum, tupelo, cottonwood, sycamore, white ash, elm, hackberry, soft maple and oak.

Knoxville and Erwin, Tenn. with Buena Vista, Va. produce the finest Appalachian yellow poplar, red and white oak, basswood, beech, buckeye, white ash, maple and walnut.

Fine red and white oak, poplar, beech, white ash and sycamore come from Madisonville, Kentucky.

Northern mills supply a large volume of yellow birch, hard maple, basswood and beech.

A Distributing Yard at Buffalo, New York maintains an inventory of Southern, Appalachian and Northern Hardwoods in addition to red cypress.

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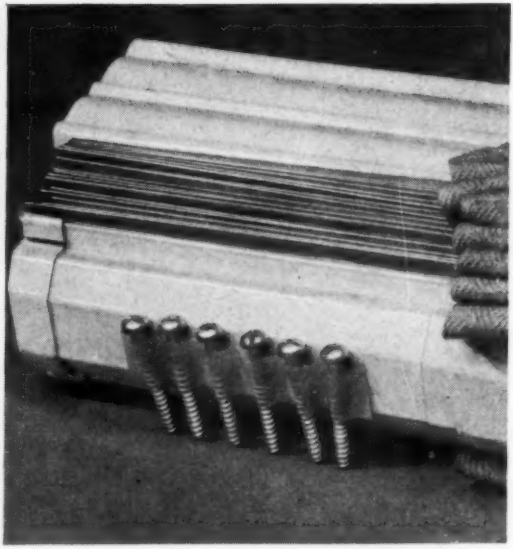

Continental's Envelope and Taped Screws Solve Problems when Fasteners Must Accompany a Product!

Here's how they can ease some of your packaging difficulties

If your product demands the fasteners must be included with it, the chances are that Continental can help cut your handling costs. Continental's taped screws and envelope package screws have surprised many producers with time saving results. They eliminate costly hand sorting, short counts, and loose units in your package.

All tapes and envelopes are filled automatically by machine and can be printed with your trade mark and directions prior to delivery.

Continental also offers you many other cost-saving suggestions. It will pay to talk it over with them. Let them prove that you can *always count on Continental.*

Continental Screw Co.

Manufacturers of Holtite Fastenings

NEW BEDFORD, MASSACHUSETTS, U.S.A.

of New Jersey and New York with conspiring to force paint manufacturers to sell only to recognized dealers. The combined group is charged with the effort to restrain competition in the inter-state sale and distribution of paint, wallpaper and allied lines. The groups involved include the Retail Paint and Wallpaper Distributors of America, Inc.; Paint Dealers Institute; Paint Dealers Association, Inc.; Paint Distributors Association of Long Island, Inc.; Westchester Paint and Wallpaper Dealers Association, Inc.; Hudson-Bergen County Paint Dealers Association, and North Jersey Paint and Wallpaper Dealers Association, Inc.

Federal Trade Commissioner John W. Gwynne of Waterloo, Iowa, was appointed Chairman of the Federal Trade Commission by the President; Sigurd Anderson, former Governor of South Dakota, was sworn in as a new member of the five-man Federal Trade Commission filling the vacancy created by the resignation of Edward F. Howrey. Working with the FTC the Mayors of New York, Philadelphia and Pittsburgh are organizing a National Committee of Mayors which they hope will include 100 of the nation's largest cities. It is their aim to secure effective control over various common interests of benefit to trade and commerce in their communities.

The first peace-time compulsory Universal Military Training Act in the history of the nation was enacted by Congress just before it left on its vacation. It creates a reserve of three million men, and will cost the nation a minimum of $4,000,-000,000 and up toward $5,000,000,000 per annum. Eisenhower is not satisfied with it and wants more men in the Reserve.

Its outstanding feature is that it gives the President, as Commander-in-Chief, the authority to call up a maximum of one million additional Reservists at any time without consulting Congress, whenever he deems there is an emergency. He has the authority to determine the character of any emergency and to designate the emergency, and make the call whenever he feels that an occasion constitutes an emergency. In other words, he can call one million more men into service whenever he feels he can justify the call to the country. There is no specific authority how he may use these million troops, where he may send these troops, or how often he may determine there is a new emergency for which he may require another million men. Congress did not give any authority to send them outside the limits of the United States; but members of Congress say the implication of past usage would seem to give authority to do what the Commander-in-Chief pleases with the troops in what he may deem an emergency. They suggest their only control over the disposition of the troops would be to refuse to appropriate funds for whatever use the Commander-in-Chief wishes to make of the men, particularly in sending them beyond the borders of the United States.

Under the tightening of credit, Government has no more no-down-payment mortgage loans for GIs. All 30 year mortgages have been stopped. Hereafter the longest mortgage terms available will be for 25 years. For non-GI homes, down payments require a minimum of 2%.

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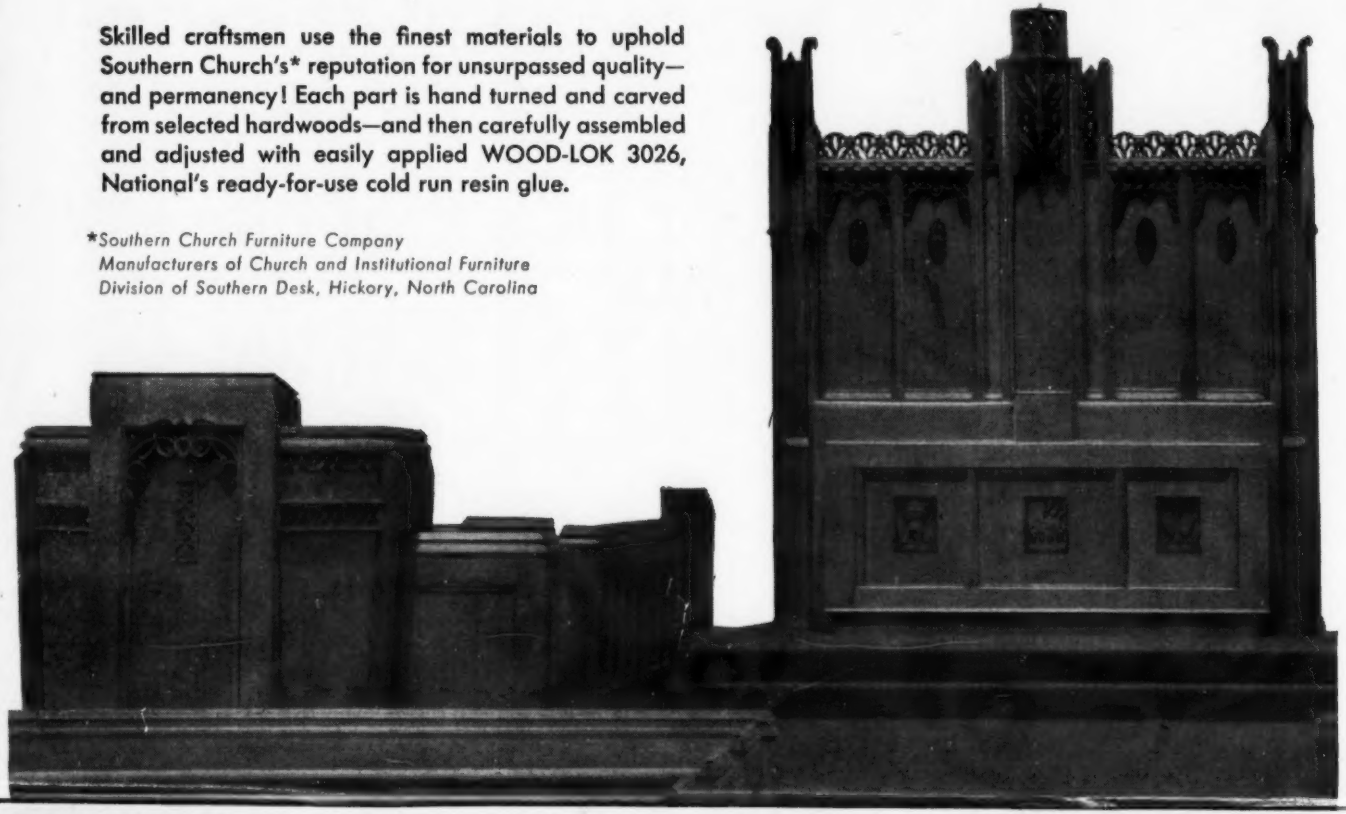
Skilled craftsmen use the finest materials to uphold Southern Church's* reputation for unsurpassed quality—and permanency! Each part is hand turned and carved from selected hardwoods—and then carefully assembled and adjusted with easily applied WOOD-LOK 3026, National's ready-for-use cold run resin glue.

*Southern Church Furniture Company
Manufacturers of Church and Institutional Furniture
Division of Southern Desk, Hickory, North Carolina



WOOD-LOK 3026 produces a handling bond in as little as 15 minutes. And often

WOOD-LOK 3026 provides a 5 to 7 minute open assembly and lining up no

WOOD-LOK 3026 simplifies the gluing of long grooves. It stays fluid in Nation

WOOD-LOK 3026 produces a handling bond in as little as 15 minutes. And often reaches machining strength in less than one hour.

WOOD-LOK 3026 provides a 5 to 7 minute open assembly and lining up period without fear of chilled joints or loss of strength.

WOOD-LOK 3026 simplifies the gluing of long grooves. It stays fluid in National's one-pint squeeze-applicator for fast, uniform spreading.

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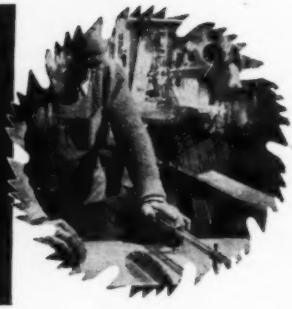

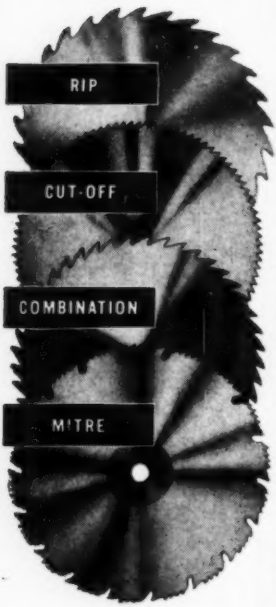

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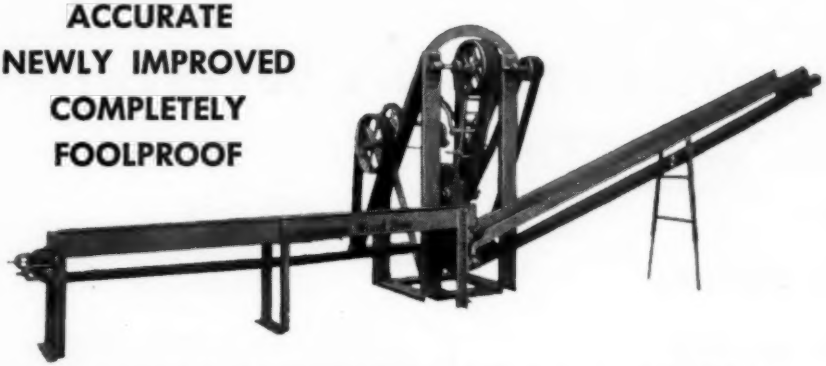

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REDUCES LONG SLABS TO SHORT PIECES
saves 75% labor in cutting wood for market.

MANY HUNDREDS IN USE

- In woodworking factories, some built into production lines, to cut precise lengths as small as 3 inches ± ¼" to as long as 24 inches ± ½". Cuts several stacked pieces simultaneously. Also used to dispose of long scrap lengths.
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SANFORD
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with 24"
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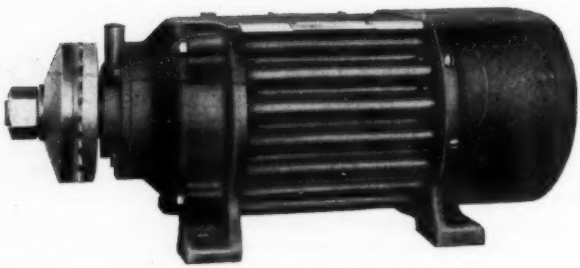

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Flexible Shafts For Woodworking Plants

By

C. Hotchkiss, Jr.

Application Engineer, Stow Mfg. Company

FLEXIBLE shafting is being used extensively in the woodworking industry for a variety of applications. It is used directly in production on special woodworking equipment and as a drive for drills, sanders, and other finishing tools. Flexible shafting is also used in woodworking plants as a drive for conveyors and for remotely controlling valves.

The purpose of a flexible shaft is to transmit rotary power or motion over a curved path. What transmits the motion is a flexible core made up of layers of wire. This is covered by a metal or rubber-covered casing which not only supports the core, but also acts as the bearing surface for the core. What makes flexible shafting advantageous is that it makes an economical method of connecting two shafts having relative motion. Also, flexible shafting does not require accurate alignment, and it eliminates dangerous exposed rotating parts.

For those interested in using flexible shafting on machinery in their plants, flexible shaft manufacturers have a variety of standard shafts available. For fixed installations, where both ends will be held in place, shafts with built-in ball or sleeve bearings are available. Where the flexible shaft is to be used with accessories as a lightweight portable tool, standard flexible tool shafts can be obtained with hand pieces or right angle heads. For drilling, even where both ends are fixed, the tool shaft should be used also, for it is built to take the thrust of the drill.

How To Select The Correct Flexible Shaft for Your Application

All flexible shaft applications can be divided into two major types—power drives, where power is transmitted, and remote controls, where the speed is slow and only the torque transmitted is considered.

Power Drives. To select the correct size flexible shaft for power drives, manufacturers furnish convenient tables, like Table 1. The following factors should be considered in selecting the correct core from these tables: The torque to be transmitted, the operating speed, the bends in the shaft, direction of rotation, operating conditions, and length.

Torque. The torque ratings for flexible shafts are based on continuous operation at the given torque. However, starting or stopping torques or any suddenly applied torque which exceeds the running torque, may cause permanent distortion of the core. This distortion, which is a permanent kink

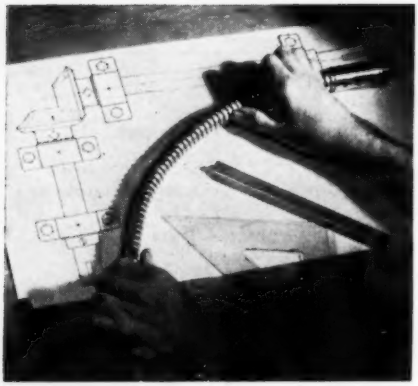

Figure 1.

in the shaft, will cause early fatigue and breakdown due to the excessive friction with the casing. Therefore, it is the maximum torque that the shaft will have to transmit that should be

Figure 2. Typical standard flexible shaft with built-in ball or sleeve bearings and couplings on each end. Can be used for power drive or remote control applications.

used in making the selection. If possible, the maximum load should be determined by actual measurement.

$$\text{Torque (lb. in.)} = \frac{\text{H.P. x 63,000}}{\text{R.P.M.}}$$

Operating Speeds. The torque capacity of shafts in Table 1 are based on a speed of 300 surface feet per minute as shown opposite each shaft in Table 1.

Therefore, to find the torque capacity of cores operating above rated speeds, multiply the maximum dynamic torque capacity (shown in Table 1) by the rated speed and then divide by the operating speed (see example).

It is obvious from the torque formula that for a given horsepower, the higher the operating speed, the lower the ap-

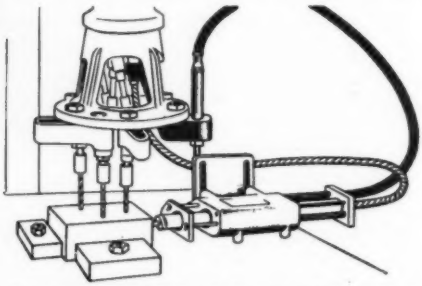

Figure 4. A flexible shaft connected from a vertical multiple drilling unit to drill a horizontal hole simultaneously. The drill units are manufactured by the Commander Mfg. Co.

plied torque, and therefore, the smaller the shaft required. Since smaller shafts mean savings in costs, the shaft is usually operated at the highest speed which the conditions of an application will permit.

Bends in the Shaft. With respect to bends, there are two types to be considered. The first type is with the shaft remaining in a fixed position so that the bends in the shaft never change. The second type is where there is relative motion between the driving and driven end, which changes the bends. Since sharp bends greatly influence the

Figure 3. Typical standard flexible tool shaft with motor connection and land piece. Right angle heads can be substituted for the hand piece. Can be used for drilling, grinding, polishing and other finish applications.

Table 1

RATED SPEED R.P.M. *	MAXIMUM DYNAMIC TORQUE CAPACITY (LB. IN.) STRAIGHT AND CURVED SHAFTS RADIUS OF CURVATURE IN INCHES											Wgt./ C. Ft.	Core Dia.	Core No. and Type
	50 to Strgt.	25	20	15	12	10	8	6	5	4	3			
4,500	2.4	2.2	2.0	2.0	1.92	1.9	1.7	1.5	1.25	1.00	.50	3.0	.124/.128	1
3,800	7.0	6.4	6.0	5.8	5.4	5.0	4.6	3.6	2.0	1.5		4.5	.148/.152	2
2,900	9.4	8.6	8.0	7.6	7.0	6.6	6.0	4.8	3.4	2.0		7.0	.185/.189	3
2,500	22.0	20.0	18.8	17.6	16.0	15.0	12.6	10.8	9.0			12.5	.247/.252	4
1,800	30.0	28.0	26.4	25.0	23.0	21.0	18.0	14.0				20.0	.308/.313	5
1,800	33.8	31.5	29.7	28.1	25.9	23.6	20.2	15.8				20.0	.308/.313	6
1,800	36.0	33.0	31.6	30.0	28.0	26.0	22.0	18.0	11.0			21.0	.324/.329	7
1,500	80.0	66.0	63.0	58.0	51.0	46.0	37.0	22.0				28.5	.368/.374	8
1,500	60.0	54.0	50.0	46.0	42.0	38.0	30.0	24.0				29.0	.387/.393	9
1,500	90.0	81.0	75.0	69.0	63.0	57.0	45.0	36.0				29.0	.387/.393	10
1,150	136.0	110.0	104.0	94.0	80.0	72.0	56.0					50.5	.497/.503	11
1,150	148	124	110	92	72	56						53.5	.505/.511	12
900	248	200	176	124	84							78.5	.610/.618	13
900	220	204	192	180	152	130						80.5	.630/.638	14
750	340	224	156	76								117	.747/.753	15
600	760	520	420									205	.998/1.004	16
440	1,500	720										343	1.298/1.304	17

Above the rated speed, torque capacity decreased directly as speed increases.

EXAMPLE — How to use the table:

The problem is to transmit ½ H.P. at 1700 RPM through an unsupported flexible shaft in a 25" radius, estimated starting torque 150% of normal operating torque.

1. Calc. Torque (lb. in.) —

$$\frac{HP \times 63000}{RPM} = \frac{.5 \times 63000}{1700} = 18.5$$

2. Correction factor for starting torque $1.5 \times 18.5 = 27.75$
3. Correction factor for unsupported shaft $27.75 \times 1.6 = 44.4$ lb. in.
4. Refer to Table No. 1. Read downward in column under 25" radius until you find a core having a rating of at least 44.4 lb. in. In this case we find that core No. 9 is rated 54 lb. in. at 1500 RPM. Since the given speed is 1700 RPM, multiply 54 by 1500 and divide by 1700. $54 \times 1500 \div 1700 = 47.6$ lb. in. (rated torque at 1700 RPM). Therefore, Core No. 9 is correct.

Figure 5. Five 3/8 size tool shafts being used for multiple drilling holes for newspaper racks. The unit is very flexible so that different center distances can be arranged by merely clamping the flexible shafts in a different jig.

torque capacity (see Table 1) as well as the shaft life, the application should be designed with as large a radius of curvature as the operating conditions will permit.

Figure 6. Cores are made up of layers of wire, each layer being wound in the opposite direction. There are different types of cores: low cost units made from a combination of low carbon and high carbon wire on automatic high speed winding machines; medium cost cores made from music wire with a high carbon center on semi-automatic machines; high cost core made of music wire that can be cut without unravelling.

Each flexible shaft has a minimum operating radius of curvature, which is the smallest bend the shaft can be operated in without damage. This varies with the construction and diameter of the core.

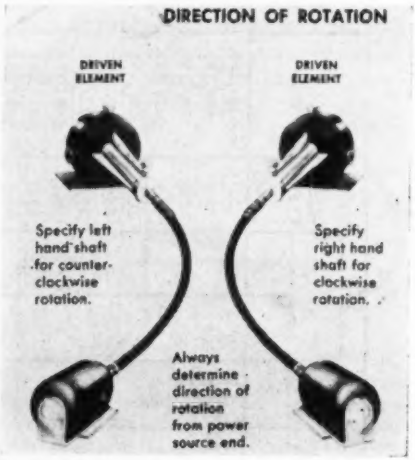
DIRECTION OF ROTATION
DRIVEN ELEMENT
DRIVEN ELEMENT
Specify left hand shaft for counter-clockwise rotation.
Specify right hand shaft for clockwise rotation.
Always determine direction of rotation from power source end.

Figure 7.

Direction of Rotation. The layers of wire on a shaft tend to act like springs. Therefore, it is important that the shaft be rotated in the direction that tends to tighten the outer layer down on the under layer. If the direction of rotation is known, specify a right hand shaft for clockwise rotation and a left hand shaft for counter-clockwise rotation. (See Figure 7.) The torque capacity of a shaft in the unwind direction is about 60% of that in the windup. For shafts that must rotate in both directions, the torque must be reduced accordingly.

Special Operating Conditions. The torque ratings given by manufacturers for shafting are for shafts that are adequately supported along their lengths by clamps approximately every 3 feet. If no clamps are used, the shaft

Core Dia.	Maximum H.P. 1750 RPM	Maximum H.P. 3450 RPM	Buffing Wheel	Sanding Disc	Sanding Drum	Drilling in Steel	Drilling in Wood
¼	¼	1/3				3/16 dia.	⅝ dia.
⅜	½	¾	6 x ½	7" dia.	4 dia. x 2 face	¼ dia.	⅞ dia.
½	1	1½	6 x 1	9" dia.	5 dia. x 2 face	⅜ dia.	1 dia.
⅝	2	3	8 x 1	9" dia.	6 dia. x 2½ face	½ dia.	1⅛ dia.

is likely to tie itself in a knot unless lower torque is applied. Therefore, as a safety factor for unsupported shafts, multiply the calculated torque by 1.6 (see example).

Torque ratings specified are for continuous operation. When operation is intermittent, these ratings can be exceeded.

There are also various service factors that must be considered. Besides starting and stopping torques, overload torques must be considered. This is especially important where the flexible shaft is not large enough to transmit the full torque of the power source. Another factor that has to be considered for some applications is varying loads, such as conveyors. Here the flexible shaft must be designed to carry the maximum load the conveyor will handle.

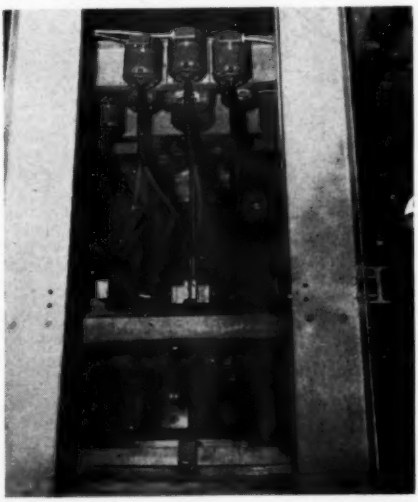

Figure 9. Multiple drilling of cable reels. This rig made it easy to switch jigs for different size reels. Ten standard ⅜" shafts and two ½" shafts were used.

Certain other conditions may require that the standard shafts cannot be used and special shafts will be required. Where flexible shafting is exposed to severe corrosive conditions, stainless steel or other non-corrosive metals must be used and heavy rubber-covered casing. In extreme cases, such as where the flexible shafting is running under water or other liquids, special seals must be used. At extremely high temperatures, the whole shaft including the core must be made of stainless steel. At very low temperatures a special light grease must be used.

Length. In power drive applications where both ends are held in place, long lengths are no problem when selecting the shaft size up to lengths of 30 feet. For portable tool applications, 20 feet is the maximum recommended length. Longer lengths are likely to cause slide fittings in the end terminals to disengage.

Most length problems involve "too little length." With short shafts, the bend requirements are usually more

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National Casein's salesmen — the glue technicians who work with you on your glue jobs — take this opportunity to salute National Casein's production men who are responsible for the consistently high and uniform quality of National Casein glues.

We know that not all glues are the same... that no single glue type or formula is adequate to every adhesive application. And we know that you — and we who represent them in your plant — can be confident that these men will deliver the glue your job requires — as you want it, when you want it — and in whatever quantity you want it — tank car, tank truck, drum or bag.

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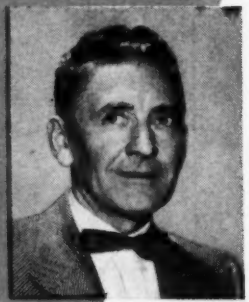

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Tennessee, Kentucky, Illinois, Indiana and St. Louis. Adhesive sales technician. Former purchasing agent, World War II vet. Congenial and capable.

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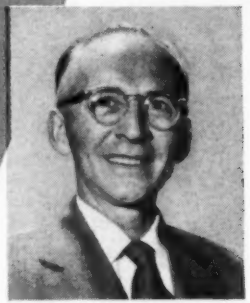

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Figure 10. Confined drilling with a flexible drill shaft powered by a portable electric drill.

difficult to satisfy. The stiff length of the end terminals must be subtracted from the total length. If the radius of bend of the free length remaining is smaller than the minimum operating radius of the shaft, some design change must be made so that the bend will not be as sharp.

Flexible Shafts For Power Tools. If the power drive flexible shaft is going to be used with a sanding drum or other accessories as a power tool, standard shafts can be selected for this purpose. Charts are furnished by manufacturers showing the maximum size buffing wheels, sanding discs, sanding drums, and drills for steel and wood that can be used with different size flexible tool shafts. The ¼" size shafts are ordinarily used just for drilling. They are often connected to electric drills for drilling in corners that can not be reached with the drill itself.

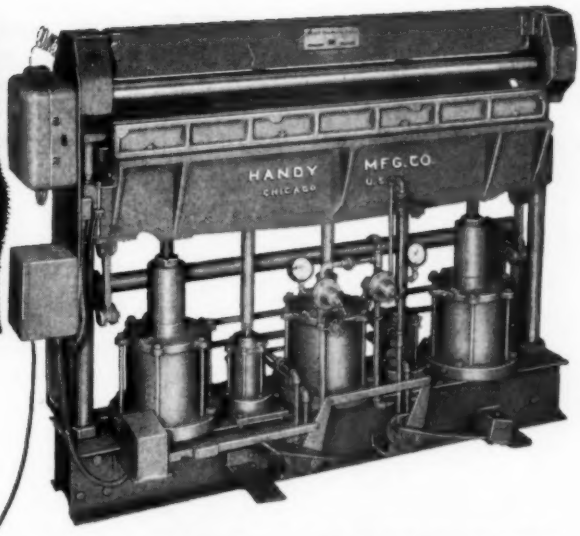
Remote Controls

An entirely different method is used in selecting the correct size flexible shaft for remote control applications. Since speed is not a factor, the only factors that need to be considered when selecting the right shaft from graphs, such as Figure 13, or tables furnished by the manufacturer are: The torque required, the total allowable deflection in degrees, and the radius of curvature of the smallest bend in the shaft.

The torque to operate the mechanism can be measured by torque wrenches or spring gauges. The total allowable deflection is determined by the type of mechanism being controlled and the degree of accuracy needed to operate it properly. The shaft selected must have a minimum operating radius (MOR) smaller than the radius of the smallest bend in the shaft. To select the correct size core, divide the total allowable deflection by the length in feet. This gives the allowable deflection per foot. Select the graph which has a maximum torque greater than that required. If the shaft is to be operated in both directions, which

Figure 11. Sanding a shrimp boat with a 12' 3/8" flexible shaft. A-1: 1 ratio right angle head is used making the disc very easy to handle.

BEND
plywood
hardboard
fibre
Tekwood

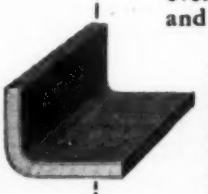


IT'S *Easy* WITH

HANDY BENDING PRESSES

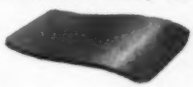
Air-powered production bending is the sure way to make your products more saleable and at lower cost. Remember—every bend eliminates a costly machined joint and the use of material like plywood gives greater strength with thinner stock.

Fully automatic Handy Bending Presses provide the only method proven for over 15 years by makers of furniture, trailer coaches, luggage, desks, displays, sewing machine and TV cabinets. These presses are simple to operate even by women; nothing to do but step on the air valve and bending is fast and precise.



6 Standard sizes of Handy Bending Presses make bends up to 153" long with radii from 1" to 5", 90° or more or less. It is easy to make one or more accurate bends in each workpiece; the design possibilities are endless. Write today, stating your problem.

MOLD VENEERS AND PANELS, TOO



Handy also makes Molding and Forming Presses for parts with contour or thickness requirements best met by production in electrically heated dies. When it takes controlled heat and pressure, call on Handy.

HANDY Manufacturing Company

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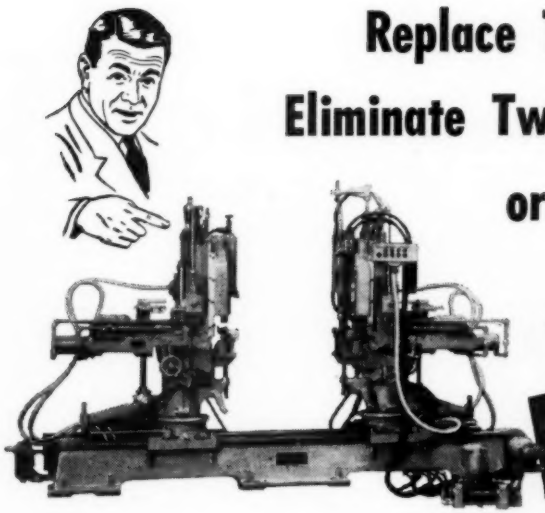
Figure 12. A small boat being sanded with a 3/8" flexible shaft.

is the usual case, use the dotted line. Mark the point on the graph that corresponds to the torque required, and if the deflection per foot is less than that required, the core is satisfactory. If not, the next larger shaft must be used.

Valve control has become one of the most common uses for remote control flexible shafting, a large number of them being used by paper mills. For this reason, manufacturers supply standard valve couplings and remote stations for flexible shafts from 3/4" to 1 5/8" diameter.

This article has been confined to standard flexible shafts with built-in bearings that can be selected directly from manufacturers' catalogs. However, for the designer who is interested in using flexible shafts in large quantities as an integral part of a machine, special



Replace Two Units Eliminate Two Handlings – or more . . . with the Bell no. 24

That's standard procedure for manufacturers using the Bell No. 24—to make chairs, radio cabinets, parlor frames, tables and bedroom or other furniture.

The Bell 24 is a money-maker, because it saws and bores, or saws and chucks **both ends at once.** Work is done accurately—assembly goes **faster** and misfit is **minimized.**

EASY TO OPERATE

Push button controls place all motors at the operator's fingertips. Any angle, up, down or sideways—is easily determined. Set-ups average 10-minutes or less.

FLEXIBILITY

The Bell 24 can replace two and sometimes three units. Bits adjust readily to meet new requirements. Both ends can be used accurately at the same time to eliminate two handlings—one set-up.

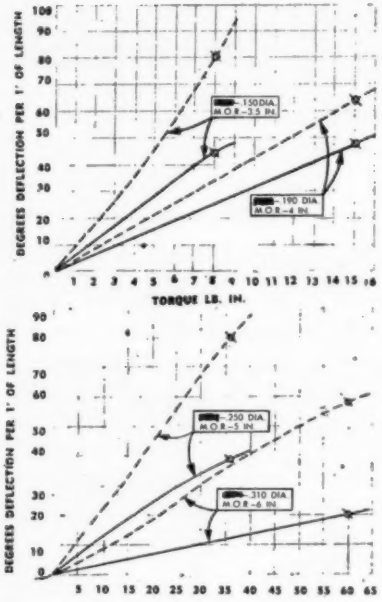
Immediate delivery

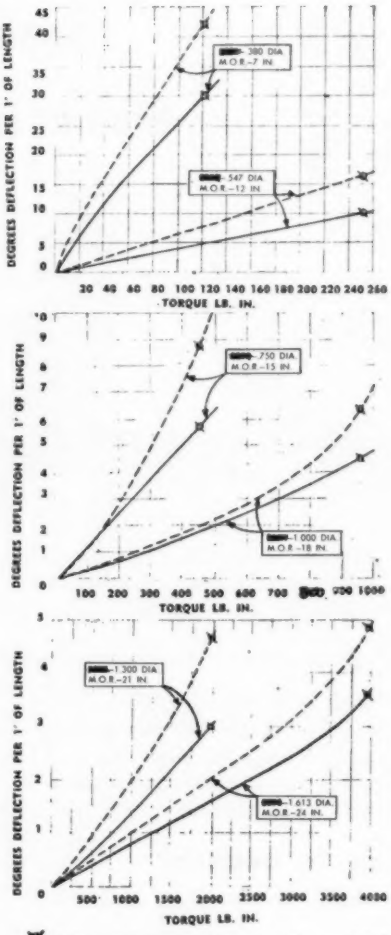
Write for Complete Details

Bell **WOODWORKING MACHINERY**

THE BELL MACHINE COMPANY, 71 Jackson Drive, Oshkosh, Wisconsin

Figure 13. Graphs for the selections of remote control flexible shafts. Core selected should have its smallest bend larger in radius than the minimum recommended operating radius. Find the torque on the horizontal scale and read the degrees deflection per foot on the vertical scale.




DEGREES DEFLECTION PER 1' OF LENGTH
380 DIA. M.O.R.–7 IN.
547 DIA. M.O.R.–12 IN.
TORQUE LB. IN.
750 DIA. M.O.R.–15 IN.
1,000 DIA. M.O.R.–18 IN.
1,300 DIA. M.O.R.–21 IN.
1,612 DIA. M.O.R.–24 IN.

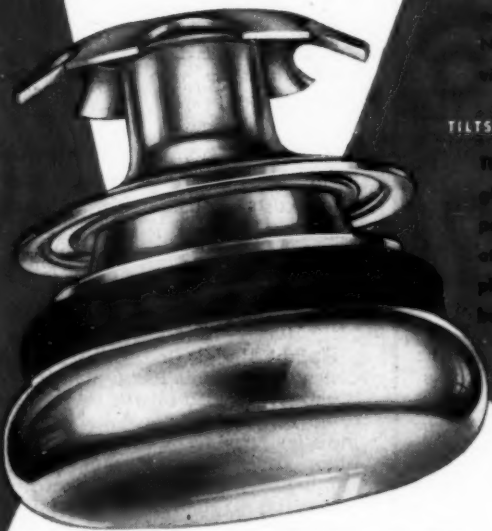
Maximum static torque ratings must not be exceeded. Solid line indicates windup direction. (Windup direction is the direction which tends to tighten the outer layer of wire.)

Broken line indicates unwind direction.

Another WOOD WORKING DIGEST technical booklet will soon be available on veneer and plywood machinery. See page 127 for booklets which can now be purchased.

New SUPER-SILENT SWIVEL GLIDE for tubular metal furniture

FLOATS ON RUBBER SLIDES ON STEEL



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TILTS, SWIVELS, LOCKS IN TIGHT

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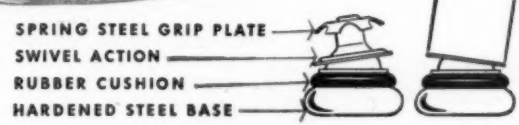

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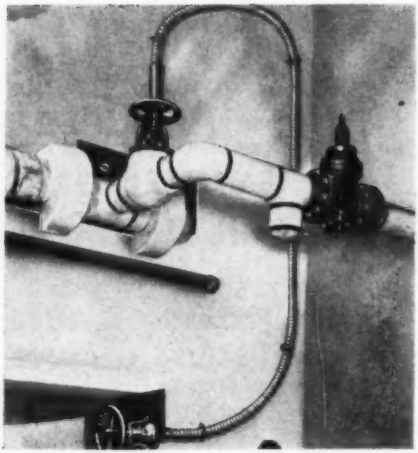


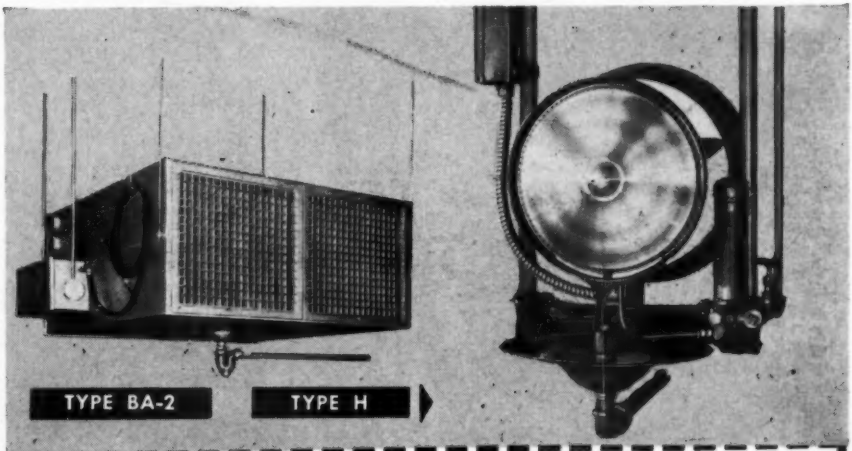
Figure 14. A flexible shaft remotely controlling a steam valve in a woodworking plant.

flexible shafts can be designed that would eliminate the bearings, thus cutting costs considerably. Consult a manufacturer for his recommendations.

PLANT LAYOUT HELP

Knight Models, Inc., 549 W. Randolph, Chicago 6, Illinois has issued an 8-page illustrated folder on the many applications of three-dimensional models for industry. Among these applications are plant design, layout and production, employee training, architecture and construction, planning and site development and to expand markets.

A feature of Knight-built plant models is that they can be produced, first, as planning boards with all machines, equipment and building components magnetized so that various layouts, building dimensions and bay sizes can be studied to determine the most efficient arrangement. Then, when the design is formalized the planning board can be reworked, at minimum cost, to produce a permanent model of the layout decided upon.



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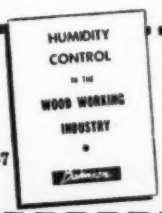

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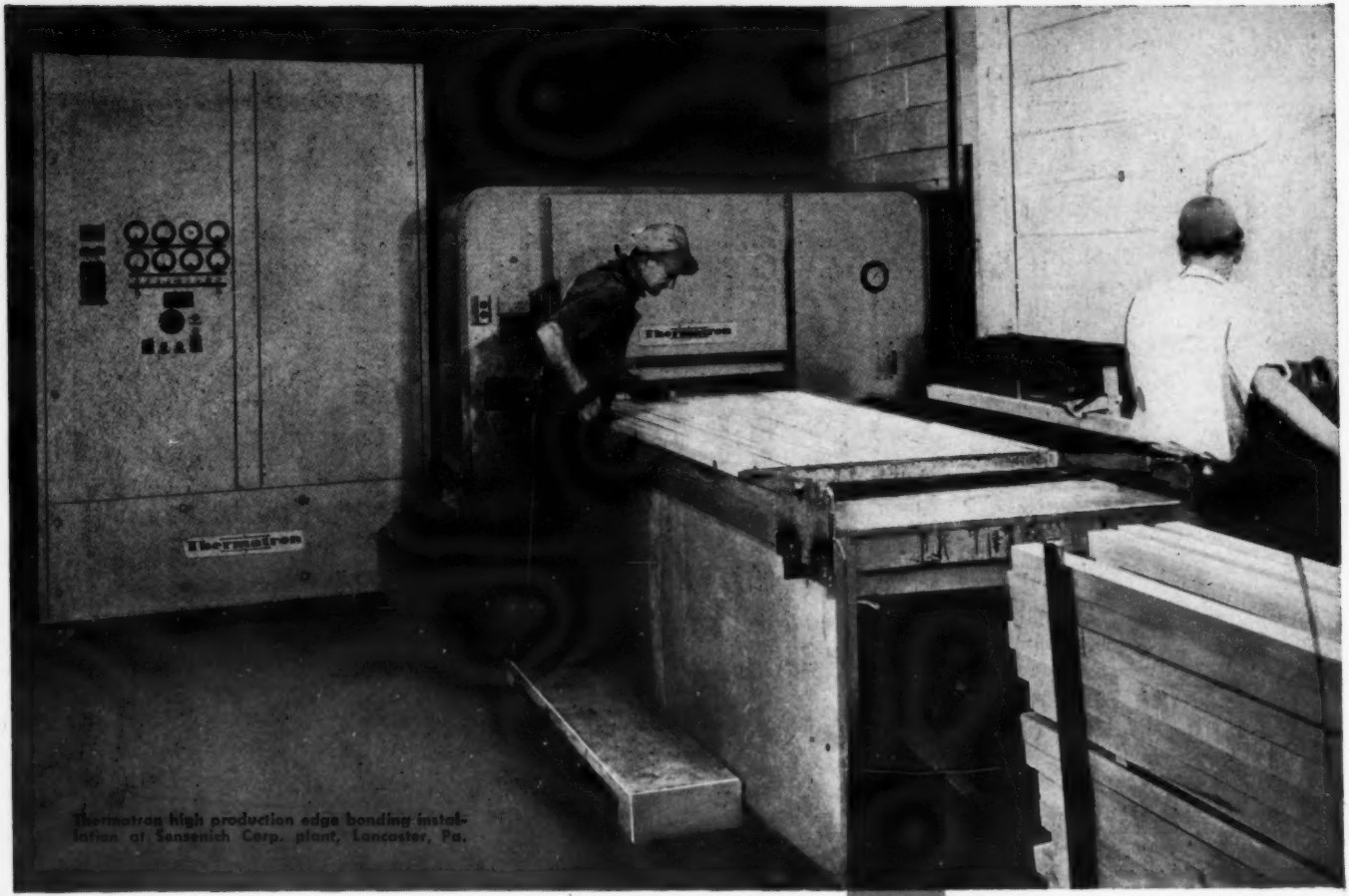

Thermatron high production edge bonding installation at Sensenich Corp. plant, Lancaster, Pa.

For Edge Bonding

For Edge Bonding

in their brand new plant

CRAWFORD chose

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HIGH FREQUENCY GENERATORS AND PRESSES

WITH FULLY AUTOMATIC CYCLING AND POWER CONTROL

Crawford Manufacturing Corporation's new "1955 Model" furniture plant in New Bethlehem, Pa., was planned to take advantage of every technological advance available to the woodworking industry.

For such an essential part of their operation as edge bonding, Crawford engineers have selected THERMATRON equipment. Their own field surveys proved THERMATRON's automatic power control reduces production time even over previous *electronic* installations by a third or more.

This modern THERMATRON equipment accommodates a wide variety of loads, automatically adjusting to load conditions during the cycle. The exact status of work in process can be read easily on the control panel.

THERMATRON electronic generators and presses bond wood in less time than it takes to tell it, and there is equipment for just about every type of operation, large or small. Let us study *yours* without obligation to effect real savings. And please write for our latest bulletin on high frequency wood bonding — WD-51.

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Greenlee Double-End Tenoner cuts costs fast

Many manufacturers have increased production, refined the quality of their products, and reduced unit costs substantially with a GREENLEE No. 545 Double-End Tenoner. This versatile machine performs many cost-cutting operations. It holds exact sizes over long production runs, thus eliminating costly "hand fitting" methods. Often referred to as "a woodworking plant in itself," it takes the place of several single-purpose machines and results in a highly streamlined, efficient production flow that produces finer products . . . in less time . . . at less cost . . . to meet today's market demands.

Write for Bulletin No. 545 GREENLEE BROS. & CO.
1870 Twentieth Avenue, Rockford, Illinois

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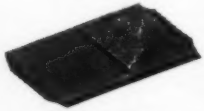
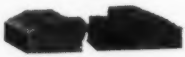


Blind dadoing and rellishing panels



Beveling and cutting clamp nail grooves

Sizing, tenoning, and coping door rails

GREENLEE

WHY USE HARDBOARDS?

By
F. O. Marion
Sales Manager
Masonite Corporation

THE volume of hardboards used industrially has spiralled dramatically during the past five years as knowledge of the product and its advantages have permeated the field. Hundreds of customers with products requiring panel materials now use hardboard for these reasons:

1. They can obtain the type, quality and size they need. Masonite Corporation, for example, now has available 44 types and sizes of hardboard for its industrial customers, plus several cost-saving services at the mill.

2. They find that the product handles readily in any woodworking operation, with economies made possible by uniform sizes and excellent finishing qualities.

3. They can get technical advice which assists them with manufacturing problems and, in many cases, brings production economies.

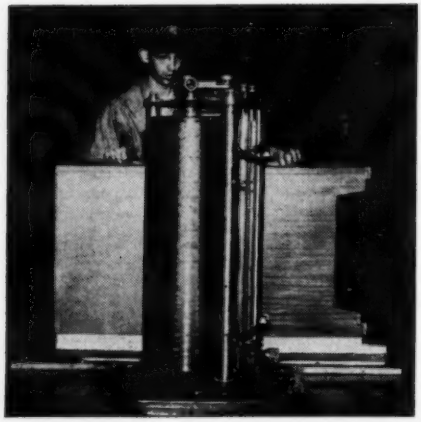
4. There is consumer acceptance of hardboard as a result of years of advertising, sales promotion and publicity.

Perhaps the most dramatic instance of an industry-wide acceptance of a specific product for a specific purpose has come about during the rapid growth of television in recent years. The story is interesting in itself, but it holds far-reaching implications in allied industries for the future.

Faced with the necessity of reducing production costs, but maintaining high appearance standards, the fast-moving television industry was casting about for a panel material that would assist in bringing lower prices to consumers and establishing a mass market.

In these early stages, Marsh Wall Products, Inc., the leading manufacturer of plastic-finished hardboards, was conducting experiments on printed woodgrain finishes. The Marsh production was exclusively on Masonite's Tempered Duolux. Machinery developed for Marsh gave such excellent results that several firms now provide woodgraining equipment for various industries. Hand in hand with the offset gravure process, in innumerable instances, went the Tempered Duolux, which actually was a custom-made product for television cabinets and the like.

About four years ago two of the largest, most progressive TV manufacturers adopted the improved wood grain finish technique for their cabinets. Now most of the other well-known makers have followed their lead and secured the advantages of this modern method.



Workman guides cabinet with sides of hardboard past the vertical Polyfax printing equipment which consists of the engraved cylinder and printing roll. Polyfax is a three-step finishing system consisting of a ground coat, a print applied by offset gravure, and a clear protective top coat.

Many of the television cabinets being built today are Tempered Duolux with a woodgrain finish by an offset gravure process. Reasons why the economy-minded television industry adopted this process so wholeheartedly is a signpost for all segments of the woodworking field.

First, why was Tempered Duolux the material that filled the bill? Here are some of the answers:

It has a dense, smooth, mirror-like surface—ideal for the woodgrain finish.

Being a manufactured wood product, Tempered Duolux is a wood panel having a specified range of physical properties. For example, the moisture content is controlled at the production plant. In terms of end use, controlled moisture content provides the dimensional stability required under typical home conditions. In cabinet manufacture, the product's dimensional stability results in fewer rejects in the plant and complaints from customers.

The gluing qualities of Duolux proved to be good. Four methods used are: cold press, hot press, ultra-high frequency and strip heating. Uniformity of caliper of the Duolux panels provides even pressure between the wood and panel parts.

Fewer steps—and consequently lower expense—are involved in the finishing operation. More of the steps are mechanical. In brief, the process is as follows: Use fine sander on the Duolux, apply sealer coat, touch sand, apply ground coat primer, touch sand, print wood grain, apply lacquer coat.

Among newer applications for hardboard are sliding doors. Workman is shown slipping the painted doors into position on this Steelframe unit designed by George Nelson for Herman Miller Furniture Co.

There is negligible strike-in or starved finish if the proper ground coat has been applied. The finish is mirror-like, as the surface is grainless, dense and uniformly smooth.

The rebirth of offset gravure woodgrain finishes, about four years ago,

Underneath the Formica top of this cocktail table by Mersman Bros. is a base of hardboard. There is no grain or imperfection in the smooth Masonite Presdwood to mirror through and spoil the appearance of the surface.

has opened new vistas to numerous facets of the woodworking industry. Until that time, printed woodgrain by former processes was definitely on the lower-quality side, so that the process itself was associated with cheap lines in the minds of manufacturers, dealers and the final purchasers.

It took some courage, therefore, with the development of the offset gravure process, for the earlybirds of the television industry to undertake a simulated woodgrain finish for their products in the face of the early history of prints. The new process is far superior to the older methods. Quality printing, then, on a quality product met a demanding need by a potentially huge industry. Seldom has a combination been accepted with such incredible speed.

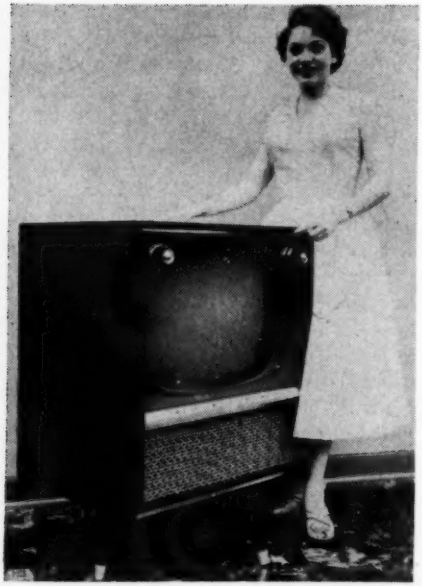
This success in the electronics industry has stimulated considerable interest, for example, in the closely allied furniture industry. In the North Carolina area and continuing into the south, furniture manufacturers in several instances have installed their own woodgraining equipment to emulate the television cabinet success in their own case goods lines.

In addition, the manufacturers of cocktail and occasional tables are pioneering in this new and more economical production method with surfaces in woodgrains or handsome decalcomania finishes—over hardboards. At the June furniture markets, a considerable number of showrooms exhibited such finishes—evidence of the growing acceptance in a field which is noted for its hewing to the traditional in manufacturing methods.

A common application for hardboards is drawer bottoms as in this buffet from Heywood-Wakefield's "Cadence" grouping. A colored plastic type finish is used on the hard board.

A word should be said also about decalcomanias. This process, too, has developed fast in recent years. Where special effects are desired, decals have proved highly effective.

Beautiful marble patterns, exact reproductions of imported stones, appear



Television cabinet is an example of woodgrain printing on Masonite Duolux. After fabrication, the cabinet is printed by offset gravure by means of vertical machinery which applies a continuous pattern. A durable plastic finish is then applied.

as decals mounted on Tempered Duolux. As components of coffee tables and other home furnishings, the richness of the marble pattern enhances the appearance.

Since other materials are used to some extent for television cabinets and they too can be woodgrained by an offset gravure process, it may be well to point out the versatility of dealing with Tempered Presdwood, in comparison.

Due to the high cost of dies, relatively few cabinets of molded plastic are being produced. More, of course, are made of metal than with the plastics, but the same inherent financial problem exists with either—the high cost of the dies and consequent inflexibility in the matter of model changes. In comparison, the manufacturer is not concerned with dies when he uses hardboard for his cabinets. Styling changes may be made with practically no loss of production time and at minimum, negligible cost.

Let's turn from the news-of-the-hour aspects of hardboards and consider them from the long-range viewpoint. There are certain inherent advantages of interest to all producers of furnishings, transportation vehicles, merchandising and display items, toys and games, machinery and manufacturing plants; power, lighting and electronics fields—the primary ones in which hardboards have wide use.

There are many types, sizes and thicknesses—the properties and dimensions to meet a designer's exact needs.

There are many methods of fabricating hardboards, which can be sawed, bent, die cut, machined, laminated and fastened in many ways.

The range of finishing possibilities includes paint, lacquer, enamel, synthetics and various novelty finishes.

Hardboard has uniform strength in all surface directions. It is grainless and will not split, splinter or crack. It has great surface strength, being resistant to denting, abrasion and scratching. Its moisture resistance is high, and it will withstand repeated wettings.

Although hardboards are denser than most species of wood, they are easily fabricated with common woodworking tools as well as power tools. They may be cut with saws or abrasive discs, drilled with twist drills or tungsten carbide tipped drills. Fly cutters may be used for cutting large holes or discs. Masonite hardboards are exceptionally

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adaptable to rapid, economical quantity production of intricate shapes by means of dies. Steel rule dies are adequate for cutting ⅛″ panels.

Great versatility is inherent in the bending methods. Bends may be either supported or free-standing. Panels may be bent either dry, cold-moist or moist and heated. Hardboards may be laminated to themselves or to various other materials. Examples widely used in various industries are as face-veneers over wood or a plywood core, cross-banding, core with wood veneer faces, cross-banding or core for decorative laminates, and a core for metal faces.

Typical fasteners used with hardboard products are nails, bolts, rivets, staples, screws, toggle bolts, animal and vegetable glues, rubber base adhesives, synthetic resin adhesives and casein glues.

How to use portable routers to cut production costs

Free 48-page Router Manual shows you the *quickest and easiest* way to do dozens of profitable woodworking jobs. Make plain and fancy molding from scrap lumber, cut perfect butts on doors and jambs, mortise stair stringers in minutes, make sink cutouts in plastic laminates, etc. – in far less time, at far less cost, far greater *profits!* Write for your FREE copy – no charge, no obligation.

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Accounting For Bigger Profits

By
William W. Wade

THEY say business is picking up, but there's a certain Mid-Western furniture manufacturer who isn't cheering. He's producing more and selling more. He's meeting the prices set by his competitors, but his earnings are low. He can't understand it either, because some of his rivals seem to be doing fine.

A Long Island boat builder is expanding all over the lot, selling double his last year's volume to water-minded suburbanites. He doesn't know it, but in spite of his apparent prosperity, he's sailing dangerously close to some financial rocks. He has entered the slack winter season with working capital so low it's bound to be exhausted by spring.

A Western toy maker thinks his business woes come from his equipment. He knows it's old, and he has decided to re-equip his shop from top to bottom—just as soon as he can get the money together. Meanwhile, of course, he'll do his best getting along with what he has.

These people don't seem to have much in common except that they are all in the woodworking industry and they are all in trouble. But it's possible that their troubles all come from one source—inadequate business records and lack of professional financial advice.

The variety of products turned out by almost any woodworking plant, the amount of capital equipment a manufacturer must have, the problems of inventory control and productive use of skilled labor, all point to the need for the systematic use of sound accounting knowledge. And, let's face it, many small woodworking concerns and some medium sized ones struggle along with ideas of financial management as ancient as the covered wagons

Scale down your costs for more profit. The first step is to get your records in shape so that you really know what your costs are. What about your overhead?

Out on a limb? Overextended credit has doomed many an enterprise.

they long ago gave up making. Some companies call in a certified public accountant at tax time, but they let things slide in between.

The idea of calculating the break-even point of different product lines, the notion of installing a comprehensive cost accounting system, the concept of planning for the future with the trained advice of a CPA—these thoughts just don't occur as often as they should. Yet, if you delve into the individual stories of business failures, you frequently find inadequate accounting as one of the contributing causes. And if you look at the success stories, you always find management using its financial data to plug leaks and to plan ahead.

KEEPING TABS ON COSTS

Take the case of the Mid-Western furniture manufacturer. His trouble is that he knows more about his competitors' prices than he does about his own costs. Despite the fact that his plant and labor force are best suited for products of quality craftsmanship, he has also been attempting to turn out furniture lines that bigger producers can knock together for half his costs. He has lowered his prices to meet theirs so the orders will keep coming in, as he "likes to see the plant busy."

But a CPA's examination of his cost situation might easily show that his low-priced line is really produced at a loss, draining the profits from his quality sales. If so, his formula for success would be to consider his true costs and concentrate on meeting his competition only in the field where he has real advantages.

PLANNING YOUR WORKING CAPITAL

The Long Island boat builder is "too busy" expanding to study his own books. He is in the same fix that many a newly successful businessman lives to regret. Because his output is snapped up, he's tempted into unsound financial practices. Perhaps he gives too much credit; perhaps he takes too much; perhaps he does both. At the same time he is buying supplies and equipment right and left without adequately considering his need for work-

Old inventory got you in its clutches? Good accounting records will help keep you out of danger.

What isn't in the glue counts, too.

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This article was prepared in cooperation with the American Institute of Accountants, national professional society of certified public accountants.

ing capital. Then suddenly he wakes up one day with bills to pay and no cash to pay them with, even though his business is bustling.

With regular CPA advice—including forecasts of his future financial position, a careful watch on his accounts receivable and a check on his own indebtedness—the man with an expanding business can avoid some of the worst growth pains.

The amount of capital that every woodworking enterprise today has to put into equipment calls for some careful accounting treatment. The businessman who wants to re-equip his plant from top to toe with saws, planers, sanders and ever-more-versatile apparatus all in one fell swoop just isn't facing economic facts. His aging equipment now in use may be costing him money; his hopes of refurbishing his plant overnight may be utterly unrealistic from the financial point of view.

CONSIDERING THE TAX EFFECTS

Present day taxes make every plant owner conscious of the depreciation problem, but that doesn't mean that he knows all the answers. For instance, a Southern manufacturer who had built a thriving business in a shop equipped with machinery bought at auction began looking around for replacements.

He was impressed with what the new models could do; he also found prices unexpectedly high. When he started checking on second-hand machinery, he discovered that the machinery already in his plant had a higher resale value than the price he originally paid for it.

He had just about decided that there wasn't much use in getting new tools until the old ones had worn out when he talked it over with his CPA.

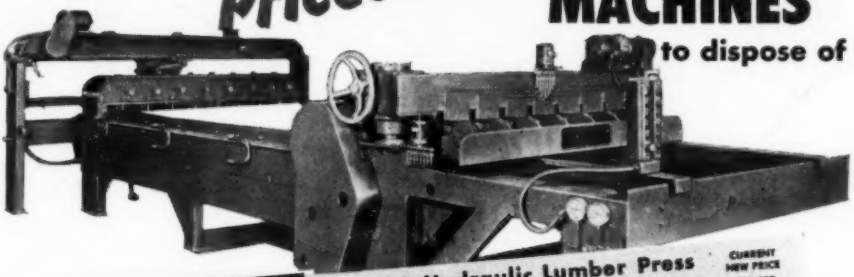
Together they studied the situation hard from three angles—plant efficiency, finances and taxes. They decided that the Southern manufacturer should sell his old equipment at a profit and buy new even at the relatively higher prices involved.

Here's why. The manufacturer was paying income taxes at a fairly high rate. By selling his old machinery at a profit, he was able to register a capital gain, taxable at a maximum of 25%. By putting the proceeds of the sale, plus additional money, into the new equipment, he could depreciate the price of the new machinery against ordinary business income. What's more,

Strange as it seems, the small businessman often pays more tax than necessary. A slight change in a transaction may make a big difference in the tax liability.

Name your Prices!

We still have a few surplus WOODWORKING MACHINES to dispose of



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The following pieces are also available. Prices listed are today's new prices and our original Sale Price for comparison.

Make Us a Reasonable Offer!

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• Porter Facing Planer, 36", Model 700	$6,300.00	$4,600.00
• Whitney Double-Surfacer, No. 33, 40" (ball bearing)	13,000.00	8,700.00
• Diehl Edge Jointer, No. 660, complete with INFEED, RETURN FEED and TURN OVER	6,735.00	5,100.00
• Sheridan Veneer Clipper, 80", 5 HP motor	12,000.00	6,500.00
• Dennis Veneer Taper, No. 2, 36"	2,300.00	1,150.00
• Black Bros. Glue Mixer, 60 gal. capacity	625.00	470.00
• Black Bros. Glue Spreader, 80", 1½ HP motor	3,000.00	2,000.00

Description	Current New Prices	Our Original Sale Price
• Mattison Cross Cut Saw, 16", with conveyor table	$ 900.00	$ 665.00
• Onsrud Auto Shaper, Model W123	7,500.00	3,750.00
• 2 Whitney Double Head Shapers, Model 39	3,400.00	1,500.00
• Whitney Single Head Shaper, Model 182	1,800.00	1,200.00
• Pico Dovetail Machine	7,500.00	3,500.00

PLUS—Hall and Brown trim saw, Mauk single spindle shaper, Royle and Sons trim saw, 2 Handy thermo controlled banding clamps 72" x 48" x 18", 3 case clamps 48" x 27" open to 48", close to 15".
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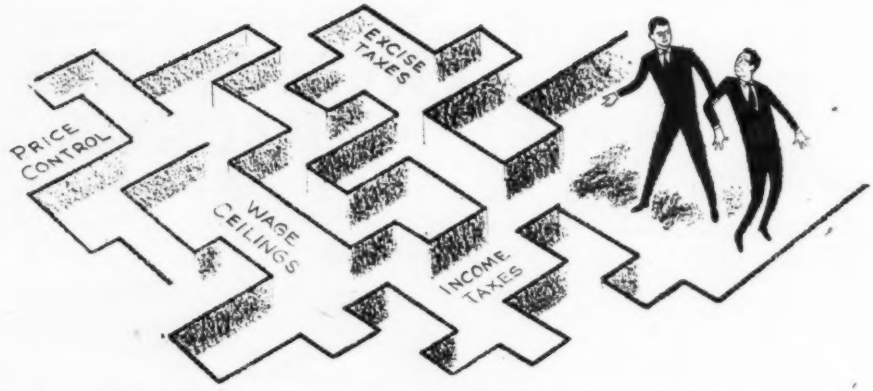

Government regulations are getting more and more complex. If you try to be your own expert, you'll have less time for your business and you may still go wrong. With the help of a professional accountant you can be sure your tax returns and other required reports are properly prepared—and you save your own time for your real job of managing your business.

under the 1954 tax law he could use a new depreciation method giving him bigger deductions during the early life of the machine. Results of the whole process: higher net worth of the business; reduced taxes; better plant performance.

Another thing the CPA suggested was a regular program of buying new machinery and replacing old, carefully meshed in with reasonable sales forecasts, production planning and financial budgeting.

He pointed out that good records and sound accounting practices were the tools of management planning, requiring just as much care and attention as the efficient new woodworking tools the manufacturer was installing.

The CPA's competence to guide businessmen in using their records for creative management comes as the result of his professional training, his experience with business problems of many different clients and the standards and ethics maintained by the accounting profession.

The woodworking executive can get his best guidance from his CPA if he consults him on a regular basis, taking up not only day-to-day problems but the over-all picture. He might start by using the following eight-point check list of questions suggested by the American Institute of Accountants:

1. Are my records adequate and efficiently kept?

2. Do I know all I need to know about my costs for different product lines? Are my prices figured correctly?

3. Is my inventory situation in good shape?

4. Am I getting all my legitimate tax savings?

5. Am I figuring depreciation on my plant and equipment correctly?

6. Is my insurance protection adequate?

7. Am I really planning in advance—or just meeting daily or weekly crises?

8. In general, is my business in good health?

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*Thousands of square feet of Masonite Tempered Presdwood went into a "sea wall" along Chicago's lake front. After nine icy winters and steaming summers, the panels showed no discernible change in size or shape.

Choose This Man He Makes The Difference

MASONITE CORPORATION

MANUFACTURERS OF PRESDWOOD PANEL PRODUCTS

MANUFACTURE OF WOODEN MATCHES

By
Paul Graham

OVER 500 billion matches are used in this country each year, yet our per person expenditure for a monthly supply seldom exceeds 6c per person. Despite paper match competition, wooden matches are still being used in astronomical quantities. To meet this tremendous demand for matches, a single match plant produces around 100 billion matches per year.

This plant is operated by the Ohio Match Company at Wadsworth, Ohio. It was founded in 1895 by E. J. Young and is now rated as one of the largest match producers in the country. Its modern buildings provide some 15 acres of floor space to house about 1,600 persons employed in the production of matches.

Select white pine is the preferred wooden match material. Progressive price increases have brought it to a point where it currently costs about as much as first grade oak flooring and the industry has been forced to turn to other cheaper and more plentiful woods, such as aspen and cottonwood. Most of the wood used at the Ohio plant comes from the Coeur d'Alene Mountains in Idaho. The company pays a fee of $2.00 per thousand board feet removed from the forest to the U.S. Government Forest Service to sustain a program of constant reforestation.

Sixteen-foot logs are delivered to the company mill where superior grades are removed for match production and the balance is worked up into construction lumber and kiln dried for sale. Match lumber is conditioned by the slower and more expensive air-drying method to insure uniformity of fine texture and light color. It is sawed into 2″ planks which are seasoned from 1 year to 18 months before being cut into blocks, to insure smooth and straight matches.

After this seasoning period the match lumber is shipped to the Huetter block plant near Spokane, Washington. Here each match plank is carefully graded and inspected, with only good straight-grained lumber being selected for matches. The rest of the lumber is run through the planing mill and sold as commercial lumber.

Select planks are then surfaced at the planer on both sides before being cut into blocks, the exact length of a match, at the slasher saw. Of proper length, they are then cut into match blocks at a gang saw. The blocks are delivered to workers at chopping tables where knots, cross-grained portions and other areas considered unsuitable

Ohio wooden matches of the "strike-anywhere" variety.

for matches are removed. When a carload of blocks is accumulated, the blocks are automatically dumped into a loading machine to load cars for shipment to the main match plant at Wadsworth.

At Wadsworth, the blocks are unloaded and carried by an underground conveyor system to a brick storage house where they are held until they have equalized to the different climatic conditions. Moved into a drying room, the blocks are dried down to a point where good matches can be made.

Match machines used at the Ohio Match Company are based upon the machine originally developed by Mr. Young in the late 1800's and are huge, complex and automatic.

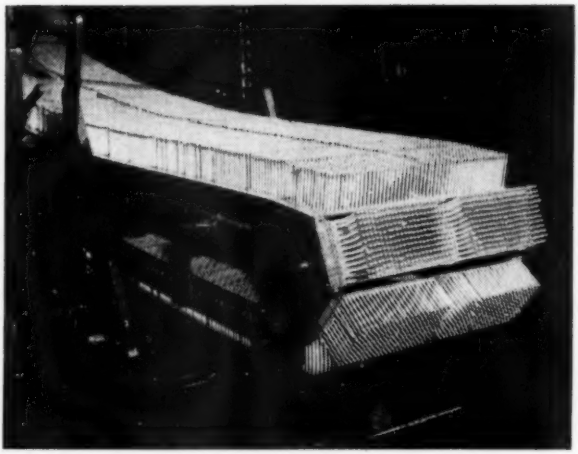
Blocks are hand fed to the machine by experienced block feeders who feed blocks so that the grain of the wood meets the cutting head properly. This cutting head is made up of 40 knives and works up and down at a speed of 40 strokes per minute. The downward stroke cuts 40 splints or sticks from the block and the upward stroke forces them into holes in an iron plate.

A complete machine carries 2,400 plates, hinged together in an endless conveyor chain. These plates measure about 4" x 16" and have capacity to hold 576 sticks each. About an hour is required to make a complete production cycle, from the time the first stick is inserted into the plate until a complete match emerges. Each machine holds about 1 million and produces about 8 million matches per day.

Stick-loaded plates are carried over springs and brushes which operate to take out weak matches. They then pass through a process which treats the stick chemically, to prevent glowing after the flame is extinguished, before passing through melted paraffin which penetrates the stick to act as a medium to carry flame from the match head to the stick itself.

Composition is applied to the sticks as they pass over a roller turning in a box containing the composition. This roller carries sufficient coating to produce the desired depth of match head. The coated sticks are then carried over wheels to allow the first dip to dry

Experienced block feeder feeds blocks into the match machine so that grain of wood meets the cutting head properly.



Stick matches move through continuous processing in endless alignment.

before another dip is applied in a similar manner. This is the ignition dip which furnishes the fire when the match is struck. The dipped matches then travel over another series of wheels through a current of air to dry thoroughly.

The plates return to the head of the machine where matches are automatically punched out and the unloaded plates receive a new set of sticks, thus making the process continuous. The matches punched out of the plate are carried down a trough to an automatic packer to be reverse packed in boxes, one half put in with heads one way and the other half with the heads in the opposite direction. Empty boxes are fed into the packer from overhead chutes. The strip is put over the matches, and the cover put on, all by automatic machinery.

Stock of match blocks in equalizing storage.

Filled boxes are conveyed to a wrapping machine for automatic wrapping, 6 boxes in a package. The packages are then placed into cases, 24 packages to a case, and the cases are conveyed to an automatic machine which glues the ends before delivery to the shipping room.

Safety matches are produced much the same as the "strike-anywhere" matches except that they receive only a single dip in a composition that will not ignite alone.

All printing required for box sides, strips, wrappers, etc. is done here. A separate art department develops all designs for various match covers and products.

WHAT IS NOVOPLY? Novoply is a 3-ply panel composed of faces of specially prepared wood flakes and a core of wood chips, all resin-impregnated, and molded under heat and pressure to make a durable, dense, hard, flat panel. Easy working Novoply assures fast assembly of fixtures that *sell* as well as they look!

How manufacturer solves problem of low-cost store fixtures with new Novoply

How manufacturer solves problem of low-cost store fixtures with new Novoply

BIG SUCCESS of Spearhead's Novoflex line proves that there's a tremendous market for low-cost fixtures that are durable and good-looking. Send now for the facts on Novoply!

Novoply Panel Specifications: Thickness: ¾"; **Sizes:** 24" x 72", 24" x 96", 30" x 48", 30" x 60" 30" x 72", 36" x 72", 48" x 48", 48" x 72", 48" x 84", 48" x 96"; also cut-to-size for volume users from panels 6' x 12' and 4' x 16'. Available in ⅜", ½", 11/16", 1" thicknesses, 48" x 96", and other sizes. **Important Note:** Only slight extra cost for long-length Novoply panels up to 16'.

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Easy-to-work Novoply is good *both* sides, is free from patches and plugs, glues perfectly, fabricates easily with regular equipment.

Unusual dimensional stability of Novoply means longer floor life for fixtures and reduced maintenance expense.

Stable price of low-cost Novoply is due to rigidly controlled factory manufacture; unlike ordinary wood products, the price of Novoply is not dependent on fluctuating lumber costs.

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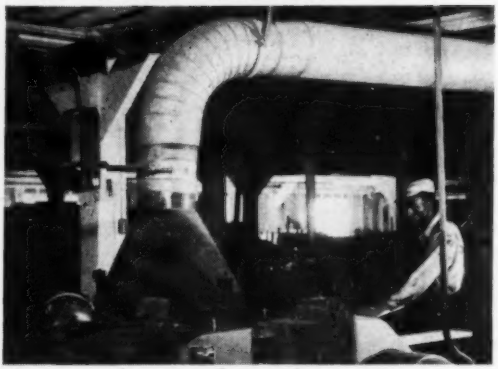

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LAMINATION FACTS

Wood product manufacturers' increasing use of glued laminating, as a method for better utilization of lumber, is bringing slope of grain into prominence as a factor requiring close observance, according to N. V. Poletika, assistant director of research for Timber Engineering Company, research affiliate of the National Lumber Manufacturers Association.

The influence of grain slope on practically all of wood's physical and mechanical properties is discussed by Mr. Poletika in his article, "Slope of Grain in Engineered Wood," featured in the current issue of "Wood Research."

Among properties affected by slope of grain are wood's reaction to heat, as in gluing wood to plastics or metal; dimensional changes caused by moisture content variations that result in warpage; load-bearing and impact-bending strength; and sound transmission. Even the efficiency of scarf joints in laminated members is partially determined by the slope of grain in individual boards.

Copies of the booklet, "Wood Research," No. 21, are available from Timber Engineering Company, 1319 - 18th Street, N.W. Washington 6, D.C.

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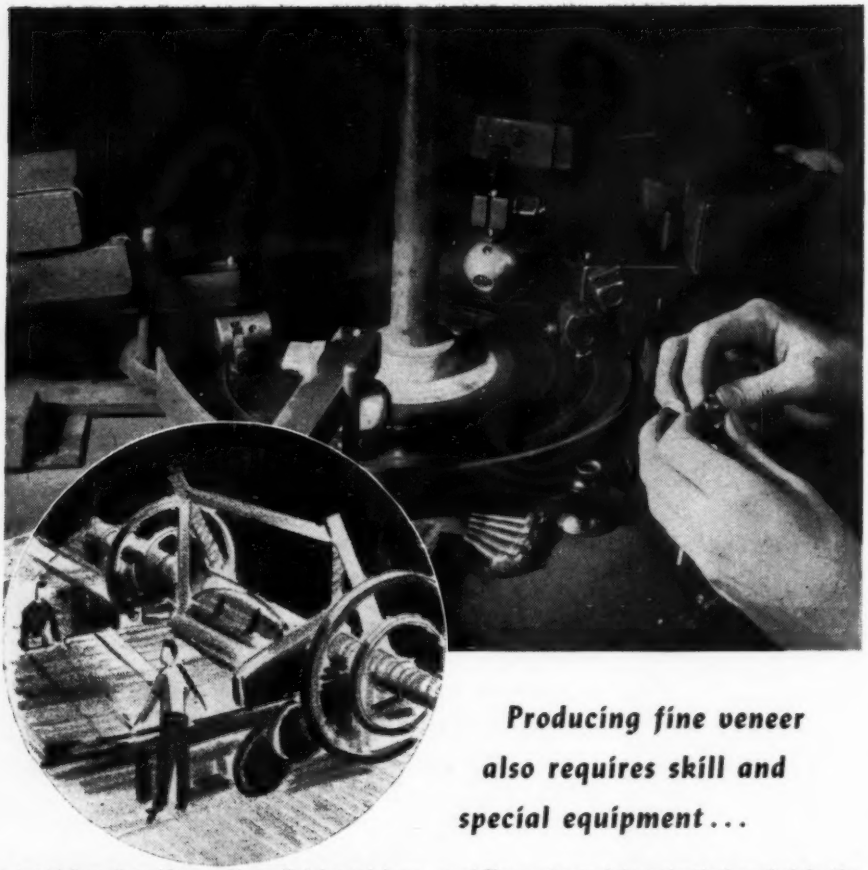
Molding Plywood With Fluid Pressure



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MOLDING PLYWOOD With Fluid Pressure

Part 2

By

Bruce G. Heebink

IN selecting a glue for bag-molding operations close cooperation is urged between the user and the glue supplier to insure best results. The selection of glues for bag molding is often limited by the performance requirements of the product. Aircraft specifications on molded plywood and specifications for glue joint performance of marine plywood require glues of high durability.

Parts to which bag molding is best adapted are either large or of severe double curvature or both, and a long period (varying perhaps from 1 to over 10 hours) is required to adjust the strips of veneer in place on or in the mold. During this period, a small amount of hand fitting with a plane or sandpaper block is usually necessary. These conditions require the use of a glue that is dry at the time of assembling and, in general, one that permits an assembly period of at least 30 hours.

It has been suggested previously that the cylinder temperature and pressure be brought up to operating conditions in five minutes or less, but in some cases, particularly where large cylinders are used, it is impossible to accomplish this with the available boiler and compressor capacity. Under such conditions there is danger with some glues of precuring the outer glue lines before sufficient pressure is applied. The relation between the characteristics of the glue and the rate of pressure and temperature rise is critical and should be examined carefully.

It is desirable in all bag molding of double-curvature parts with thermosetting glues to use a glue that passes through the fluid stage relatively slowly and flows readily while in this stage. This produces the effect of a lubricant between the adjacent plies of veneer and allows them to slip to their proper place, thus often avoiding wrinkles. Most of the glues that are designated as bag-molding glues have this property.

In addition to the characteristics just described, it is important that glues for bag molding be durable under service conditions. The phenolics and certain modified phenolics, melamines, fortified ureas, and thermoplastics meet bag molding requirements reasonably well but vary in their resistance to severe exposure conditions. Current

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Mr. Heebink is an engineer at the Forest Products Laboratory, Madison, Wis. His paper is printed with permission.

thermoplastic glues, which are otherwise well adapted to bag-molding processes, give evidence of slow flow at subsequent elevated temperatures, such as 150° to 160° F. They are especially adapted to experimental work since they have a high degree of flow when plasticized by the heat in the molding cycle, and if a wrinkle is formed in the molded part, it can often be removed by a subsequent reheating. For molded products that require maximum durability, the phenolic and melamine resin glues are most satisfactory.

BAG-MOLDING TECHNIQUE

In applying bag-molding technique it is necessary to study carefully the piece to be produced. This means a consideration of curvatures, the approximate thickness and number of plies, species, and arrangement of alternate plies. The curvature of the piece may determine the thickness of the veneers that can be used. The following tabulation will serve as a guide to the approximate relation between the thickness of veneer and the minimum radius of curvature considered practical in bag molding:

Approximate minimum ratio of radius of curvature to thickness of dry veneer for bag molding

Angle between direction of grain and axis of curvature	Ratio = Radius of curvature / Thickness of veneer
Degrees	
90	100 to 1
0	50 to 1

These ratios are only suggested minimum values; the actual permissible minimum radius of curvature will vary with the species, type, and moisture content of the veneer. The method of holding the veneer in place on the mold is usually the determining factor; therefore, the suggested ratios are well above those at which the veneer may be expected to break.

MOISTURE CONTENT

A moisture content of 8% to 12% in veneer used for bag molding is favorable, and within this range any variations depend mainly on the glue being used. Variation in moisture content between the veneer sheets in any one assembly should not, however, exceed 2%. Change in moisture content during manufacture is often serious, since the veneer strips are cut to exact shape. If the width of the strips changes in the period between shaping and assembly, considerable hand fitting will be required. The importance of dimensional stability depends on the shape and size of the molded part, but in extreme cases on larger parts some plants have found it advisable to control the relative humidity within ± 2% in the lay-up room and the rooms where veneer is stored. On other smaller parts or on parts made from narrow strips of veneer no control of average moisture content, other than that required for the glue, is attempted.

The bag-molding operation does not greatly change the moisture content of the veneer, unless leaks develop in the bag. Tests on small flat pieces indicate that the moisture loss during molding is less when using wood molds than when using metal molds.

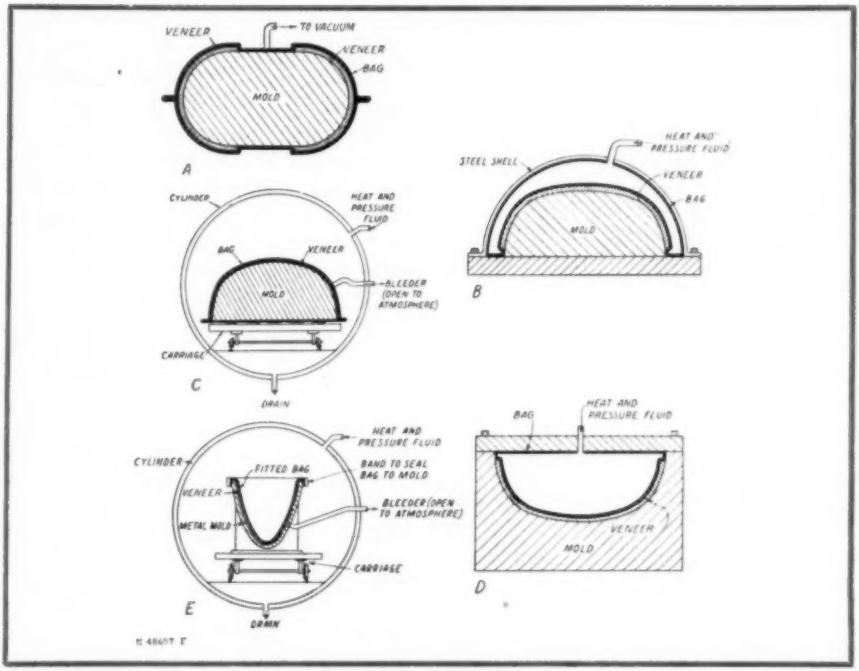

Figure 1. Five methods of forming bag-molded plywood.

It is also less in both types of molds when no vacuum is maintained on the bag during the curing cycle. Preliminary tests made on plywood molded in bags of suitable grades of cellophane indicate little or no change in moisture content of the veneer during molding when using a steam-air or steam cycle. In all these comparative tests the moisture loss was considerably less in bag molding than in hot-press operations on the same combination of species and glue.

ASSEMBLING THE VENEER

The degree of double curvature will determine the width of the individual strips of veneer. Naturally it is more economical of labor to use a few wide strips instead of many narrow ones, in order to reduce the number of necessary shaping operations to a minimum. On the other hand, if the strips are too wide, their edges will wrinkle as the fluid pressure on the bag presses the flat strips against the double-curved mold. On double-curvature molds, such as required for aircraft fuselages or boat hulls, the strips are usually between 2″ and 8″ wide.

The strips of veneer must be tapered or "tailored" very carefully to fit the mold so that a close joint is obtained between the adjacent strips. To determine the exact shape of each strip the first lay-up is carefully done by hand and later disassembled, each strip being marked to designate its position on the mold. In production,

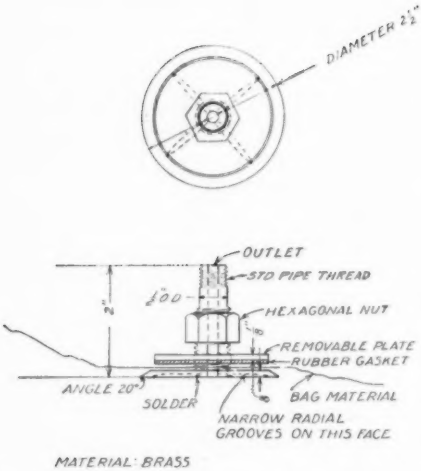

Figure 2. Metal bleeder connection designed for rapid attachment to bags.

this tailoring is usually done by first sawing the strips roughly to shape and then shaping them exactly on a vertical spindle shaper, using plywood or metal templates, each accommodating a stack of veneer strips approximately 2″ high.

Sometimes the pieces are sawed to final shape and then each edge is run through a special scarfing or feathering device consisting of a small sandpaper-lined drum and a hold-down. The strips are then spread with glue and laid on the mold so that the edges overlap ¼″ to ½″, depending upon the veneer thickness.

As the veneer strips are assembled on the mold, they must be fastened or held in place. On wood molds this fastening is conveniently done by means of staples or tacks. The first layer of veneer is stapled directly to the wood mold and, as each successive layer is applied, the staples in the preceding one are removed. Staples are left in the outer layer of veneer during the molding, and are later removed so that the finished molded piece has no staples in it.

The same principles of balanced construction that apply to flat plywood are applicable to molded plywood. For maximum resistance to warping, all plywood should be symmetrical about the central plane of thickness. In this connection symmetry involves species, number of plies, thickness of plies, and direction of grain. In theory, a symmetrically constructed panel with alternate plies laid at 90°, with respect to direction of grain, would have maximum dimensional stability. In practice, however, a construction with alternate plies at 90° to each other is often impossible in pieces of pronounced compound curvature and other angles must be used.

HEATING MEDIUMS

Heating mediums in current use are steam, steam-air mixtures, water, and air.

Pure steam is often used when high temperatures are desired. In this cycle an exhaust valve is left partly open for a short period after the steam valve is opened so that the residual air is expelled.

The steam-air mixture usually requires an air compressor in addition to a steam boiler. Some so-called steam cycles are in effect steam-air cycles as the cylinder is sealed and charged with steam without discharging the residual air. Under these conditions the temperature and pressure of the charge will not agree with temperature-pressure tables for pure saturated steam.

For economy in operation the air required in a steam-air mixture should

Table 1.—Equipment and limitations on conditions in various methods of bag-molding plywood

Table reference note No.	Illustrated in:	Major equipment required	Pressure Medium	Source of heat	Practical bag materials	Practical limits of temperature	Practical limits of pressure	Mold material
					Class[1]	°F.	Pounds per square inch	
		Autoclave Molding						
1	Figure 1, C and E	Autoclave boiler	Steam	Steam	1	260-320	20 to 80	Wood, metal, plastic or cement
2	"	Autoclave, boiler, air compressor	Steam-air	"	1	240-300	20 to SWP[2]	"
3	"	Autoclave, boiler, pump, heater, tank, air compressor	Air	Water	1	to 300	20 to SWP[2]	"
4	"	Autoclave, boiler, fan, air compressor	"	Steam coils	2	to 300	20 to 75	"
5	"	Autoclave, electric heaters, fan, compressor, gas supply	Inert gas	Radiation and convection through inert gas	1 or 2	to 320	20 to SWP[2]	"
6	"	Autoclave, boiler, air compressor	Air	Steam-heated mold	2 or 3	to 320	20 to SWP[2]	Metal, plastic or cement
7	"	Autoclave, compressor, gas supply	Inert gas	Electrically heated mold	1, 2 or 3	to 320	20 to SWP[2]	Metal, plastic or wood
		Pressure-mold[3] Molding						
8	Figure 1, B and D	Pressure mold, boiler	Steam	Steam	1	260-320	20 to SWP[2]	Wood, metal, plastic or cement
9	"	Pressure mold, boiler, air compressor	Steam-air	"	1	240-280	20 to SWP[2]	"
10	"	Steam-heated pressure mold, boiler, air compressor	Air	"	2 or 3	to 320	20 to SWP[2]	Metal or cement
11	"	Electrically-heated pressure mold, compressor, gas supply	Inert gas or air	Electricity	1, 2 or 3	to 320	20 to SWP[2]	Metal or plastic
		Vacuum-bag Molding						
12	Figure 1, A	Vacuum pump, radiant heater	Air	Radiant heat	2	to 320	to 14	Wood, metal, plastic or cement
13	"	Vacuum pump, boiler or electric heater	"	Steam or electrically heated mold	2 or 3	to 320	to 14	Metal or plastic
14	"	Vacuum pump, hot liquid tank	"	Hot liquid	1 or 3	to 320	to 14 (plus head of liquid)	Wood, metal or plastic

[1]Class 1—Steam-, water-, and air-tight at temperatures up to 320° F. Natural and synthetic rubber and some grades of cellophane.
Class 2—Air-tight and usable up to a temperature of 320° F.—cellophane.
Class 3—Air- or liquid-tight up to a temperature of 212° F.—rubber, cellophane, resin-coated cloth, and thermoplastic films.

[2]SWP equals the safe working pressure of the apparatus being used, which is determined by the type and condition of the apparatus and State safety code requirements.

[3]A mold that will withstand internal fluid pressure.

NOTES REFERRING TO TABLE 1

1. Natural and synthetic rubber give highest production bag life with pure steam; some grades of cellophane are usable for one cycle. Pressure is too low for general bag-gluing below 260° F. (20 lb. per sq. in. at 260° F.); above 320° F. there is danger of overcuring the outer glue joint and bag deterioration is very rapid.

2. Steam-air is more damaging to rubber than steam or hot water; some grades of cellophane are usable for one cycle. Circulation to avoid stratification is sometimes required, especially below 240° F.; rapid oxidation of bag materials occurs above 300° F.

3. Long bag life can be expected from hot water cycle as there is very little oxidation; some grades of cellophane are usable for one cycle. Open-storage tank may be used below 212° F.; above 300° F. pure steam can ordinarily be used to advantage since the water must be kept under the same pressure as is required for steam.

4. This is a very slow cycle due to low specific heat of air. Seventy-five lb. per sq. in. is suggested as maximum safe pressure. Precautions should be taken to avoid oil vapor from compressor and static discharges from circulating fan.

5. Carbon dioxide, nitrogen, or any other gas which will not support combustion or affect bag materials should be used. Do not use air as there is danger of exothermic reaction or explosion.

6. Mold is heated, and unheated air is used for pressure; therefore bag stays relatively cool throughout cycle.

7. Same as 6, except that inert gas is recommended to avoid danger of explosion in case of spark or a short circuit in wiring system.

8. Bag is expanded against work by means of steam. An adequate drain for condensate is required at the lowest spot in the bag.

9. Same as 8, except that steam-air mixture is used. See note 2.

10. Steam-heated mold is used; bag inflated by air pressure, therefore no drain connection necessary for bag.

11. Same as 10, except that mold is heated electrically; inert gas is recommended for safety, although air may be used.

12. Radiant heat is applied to the outside of a bag collapsed on the mold. Satisfactory bonds are obtainable at vacuum-induced pressure with certain hot-setting glues. Parts must be flat or of slight curvature.

13. Same as 12, except that mold is heated by steam or electricity.

14. Same as 12, except that evacuated bag containing work is submerged in a hot liquid to supply heat. With water, temperature is limited to 212° F. Hot oil or some other high-boiling point liquid possibly can be used with bag materials such as cellophane or resin-coated fabric.

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be injected first, followed by the steam to produce the desired temperature and pressure. The amount of air pressure at room temperature required for any cycle can be approximated by calculation if desired. For example, assume that a molding cycle of 75 pounds per square inch at 275° F. is required. From steam tables, 275° F. requires gage pressure of approximately 31 pounds per square inch. The remainder of the cylinder pressure, or 75—31 = 44 pounds per square inch, must be supplied by air. If this air is injected first at room temperature, or approximately 75° F., and later heated by the steam, its pressure is increased. The air pressure required at 75° F. can be calculated from the formula:

$$P_0 = P_1 \times \frac{T_0}{T_1}$$

where P_0 = absolute air pressure at 75° F., P_1 = absolute air pressure at 275° F. (44 + 14.7 = 58.7 p.s.i.), T_0 = absolute temperature of unheated air or 75 + 460 = 535° F. and T_1 = absolute temperature of heated air or 275 + 460 = 735° F.

$$P_0 = 58.7 \times \frac{535}{735} = 42.7 \text{ p.s.i. (abs.)}$$

42.7—14.7 = 28.0 p.s.i. (gage pressure)

The gage pressure of air required at 75° is 28 p.s.i.

The use of hot water requires an auxiliary storage tank in which the water is heated and to which it is required after use in the heating cycle. This tank is often mounted above the molding cylinder so that the hot water can be introduced rapidly by gravity through a large pipe. It is returned by means of a centrifugal pump. The pressure for the molding operation is applied by air.

When air is used as a pressure and heating medium, heating may be done by means of a steam jacket around the cylinder. Heat is sometimes supplied by steam coils within the cylinder or possibly by electric strip heaters. Extreme caution should be exercised when using electric heaters or any electric connection inside the cylinder, as the combination of compressed hot air, combustible material, and a glowing heater within a cylinder is very dangerous. In planning such an operation, all known safety precautions and regulations should be observed. The compressor should always be equipped with an adequate aftercooler and oilvapor filter. The lubricating oil in the compressor should have a high flashpoint so that

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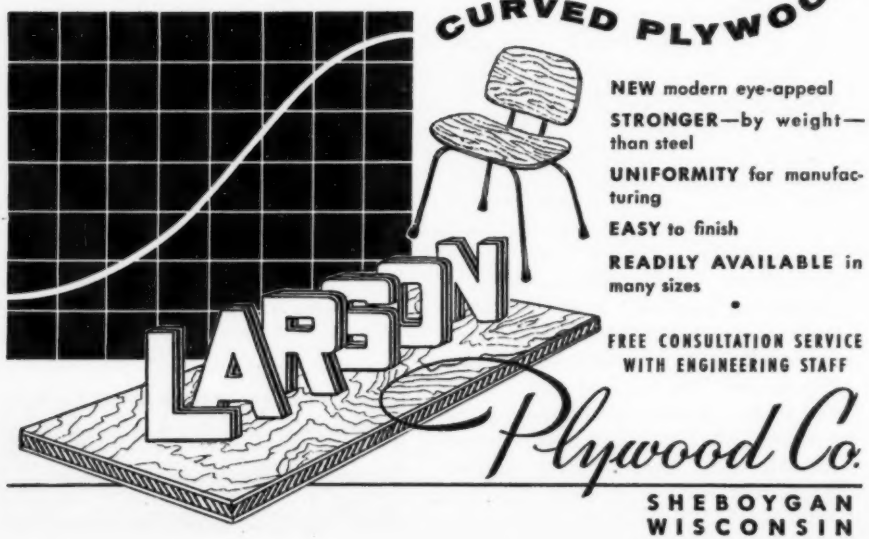
a minimum of vapor is given off. All precautions should be taken to eliminate any sparks in a cylinder charged with hot air containing some oil vapor, as a dangerous explosion can result.

Each heating medium has certain practical limits of temperature. An attempt has been made at the Forest Products Laboratory to determine these limits from actual heating tests in which thermocouples were inserted in the cylinder and at various depths in a piece being formed on a wood mold to record the rise in temperature. These limits as well as other practical limitations of 14 different techniques which have been or could be used in bag molding plywood are presented in Table 1.

Hot air is a very slow heating medium and, in addition, produces results very largely dependent upon the amount of circulation in the cylinder. There is considerable interest, however, in the use of air, for two reasons: first, leaks developing in bags do not damage the piece and the mold, as is likely with the steam or hot-water cycle; and, second, a few of the bag materials suggested as substitutes for rubber are not steam- or hot-water proof but are adapted for use with air or some inert gas.

The pressures used in bag molding vary from a vacuum drawn on the bag (atmospheric pressure or less) to a maximum of about 120 pounds gage pressure per square inch. Most current bag molding is being done at pressures from 40 to 80 pounds per square inch. Vacuum alone produces insufficient pressure for most bag-molding



operations and therefore is not recommended for critical work.

HEATING CYCLE

The selection of a proper heating cycle to cure the glue and bond the veneer into the finished molded part is complicated by the fact that the synthetic resins do not have a definite temperature at which polymerization, or condensation, occurs.

For example, a phenolic-resin film is reported to be completely cured in about ½ minute at 350° F. but requires about 10 minutes at 275° F. This suggests the development of fundamental temperature-time relationship factors for accurately calculating the time required to cure completely each of the common synthetic-resin

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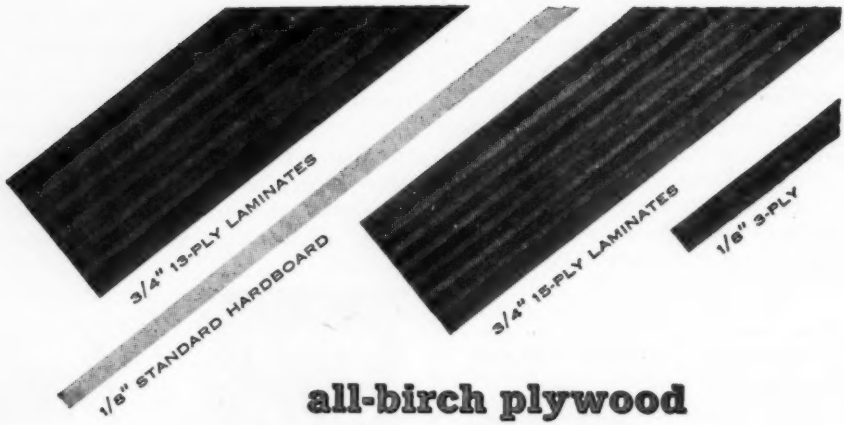

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glues but, for the present, the heating cycle can only be determined empirically.

It is necessary to maintain a uniform temperature in the cylinder throughout the cycle and avoid stratification of the heating medium by means of adequate circulation in the cylinder to secure uniform rates of heating.

Under any particular set of operating conditions, an occasional check of the actual temperature at the coolest glue line throughout the heating cycle is desirable. A satisfactory method of making this check is to use fine thermocouples and a potentiometer. Copper and constant thermocouples of No. 30 gage wire have been found satisfactory and may be embedded in the molded part without danger of injuring trimming equipment.

Approximate temperature checks have also been made in some cases by the use of temperature-sensitive crayons or paints. The final check, of course, is the ability of the glue joints in the finished product to meet specification requirements.

Partial List of Manufacturers of Rubber Bag Materials or Bags

E. I. duPont deNemours & Co., Inc., Fabrikoid Division, Fairfield, Conn.
Firestone Rubber & Latex Products Co., Fall River, Mass.
Goodyear Tire & Rubber Co., Akron, Ohio
B. F. Goodrich Co., 450 S. Main St., Akron, Ohio
Tyer Rubber Co., 100 Railroad Ave., Andover, Mass.
Voit Rubber Co., Los Angeles, Calif.

Partial List of Suppliers of Bag-molding Glues

American Cyanamid Co.
Plastics Div.
30 Rockefeller Plaza
New York City
Bakelite Corp.
230 Grove St.
Bloomfield, N. J.
Casein Co. of America
Bainbridge, N. Y.
Catalin Corp.
1 Park Ave.
New York City
E. I. duPont deNemours & Co.
Plastics Dept.
Arlington, N. J.
Durez Plastics & Chemicals, Inc.
1181 Walck Road
North Tonawanda, New York
Monsanto Chemical Co.
Plastics Div.
Springfield, Mass.
Perkins Glue Co.
Lansdale, Pa.
Plaskon Co., Inc.
2112-24 Sylvan Ave.
Toledo, Ohio
Rohm & Haas
222 W. Washington Sq.
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PLYWOOD with Plastic Faces

By Thomas Perry

PLASTICS, in sheet form, represent an industry that is growing at an amazing pace. It was only natural that their use be developed in making a super type of plywood, which has plywood backings for strength and stability, with plastic surfaces for hardness and attractive appearance. These plastic sheets are available in an almost endless variety of designs, ranging from a dignified textile or wood figure to a wild bold display. Lovers of wood may deplore the photographic reproductions, which may be of excellent quality, but when imbedded in dense plastic sheets, they provide a durability, under severe service, that can be had in no other way. Such extreme durability is not to be scoffed at in this era when ruggedness is essential to preserve our plywood products in the rapid, and often heedless, activities of the times.

With such a wide assortment of plastic types and designs, it is only natural and logical that the combining of plastics and plywood be on a custom (or to order) basis, so that the buyer can select the designs that are best adapted to his trade. Whether plastic faced plywood will become an important stock item, carried in warehouses for prompt delivery, is difficult to predict.

A glance at any of the seasonal furniture markets will reveal a wide variety of dinette suites for porch and alcove dining rooms, as well as small dining tables for restaurants and cafes. Such products are usually completely fabricated for sale in singles and sets. Looking a bit further one will find many plastic-plywood counters and display cabinets in stores and restaurants, where the plastic surroundings are in keeping with the movable equipment noted above. In many instances the plastic-plywood combinations find their way into wall paneling, ceilings, partitions and even into lighting fixtures in the same establishment. In the home, cabinets and fixtures of plastic-plywood have been satisfactorily adapted to the kitchen, bathroom, powder room and den.

It is worth noting in all of these applications, that the service demands a hard surface that cannot be marred, a smooth non-absorbent surface that can be kept clean and completely sanitary, and a wide variety of decorative and color features that can be adapted to every phase of living, from the glamorous night club to the dignified precincts of a church parish house.

ADHESIVE PROBLEMS

The techniques of adhering dense non-absorbent layers to the softer por-

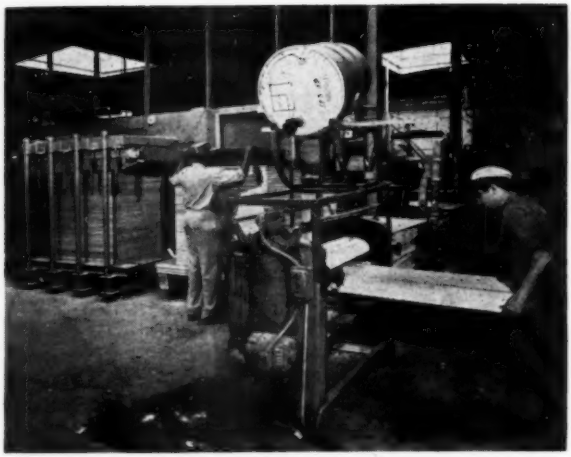


Fig. 1. Double spreading the plywood with adhesive. Factory is Hy-Light Plastics; spreader by Black Brothers.

ous surfaces of plywood present some difficult gluing problems. It is the natural tendency of any glue to be absorbed, to a considerable extent, into the minute recesses of the porous wood adjacent to the glue joints. With one non-porous surface it is imperative that the glue have unusual tackiness and also that it retain indefinitely a tough leathery bond, rather than the hard brittle glue line that is typical of many glues and adhesives. Hot pressing techniques are out of the question for plastic layers, since the high temperatures and pressures required would injure many types of sheet plastics.

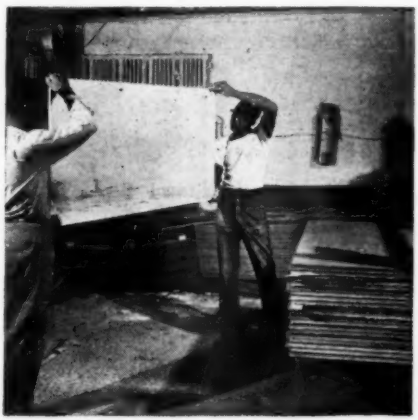


Fig. 2. Glue coated center, between the spreader and the lay-up rack. Factory is that of York Plastic Products.

One of the adhesives that has been demonstrated to be well adapted to this plywood-plastic gluing is derived from a polyvinyl resin, and one of its more important suppliers is the National Starch Products, Inc., under the trade name of "Wood Lok." Since the adhesive products of this company are widely used in this industry, most of the photographs shown have been obtained through its co-operation and that of its customers, which has been a distinct help and is appreciated by the author and publisher. The processes and examples are illustrative of what is being done in many other factories in the United States and Canada, and represent a rather new phase of developing the use of plywood along modern lines of utilization.

Adhesives derived from polyvinyl resins have several other obvious ad-

Fig. 3. York Plastic Products doubles the plastic faces to save handling.

vantages, other than the tackiness and toughness. They are non-toxic and harmless to the hands and skin of the workmen, and, being soluble in water, are easily washed off. Polyvinyl resin adhesives are supplied ready to use and do not require additional ingredients nor mixing. They can be drawn directly from the drum to the spreader. Their storage life is upwards of six months and within temperature ranges that are likely to be encountered in factory work, i.e., 20° to 30° above or below a normal 70° F. After spreading, the permissible closed assembly interval before pressing may be as long as 30 minutes, which is usually in excess of requirements.

One of the interesting phases of this pressing technique, in plastic-plywood using polyvinyl resin adhesives, is the elimination of the customary clamped bundle or bale, with its clumsy and space cluttering auxiliary equipment, "I" beams, head blocks, clamp screws, etc. These have been required to re-

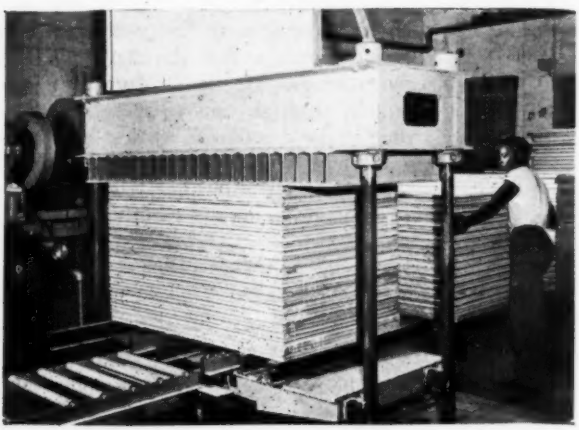


Fig. 4. Hydraulic press at York Plastic Products with package of 40 tops. Press is by Charles E. Francis.

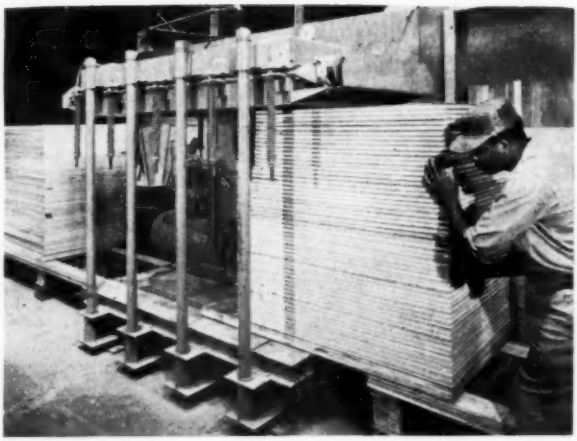


Fig. 5. Pneumatic press with package of 53 tops. Press is by Black Brothers in the Hy-Light Plastics factory.

lieve the press, since most other glues require a minimum of two to four hours under pressure, making the use of clamped bundles mandatory. With this type of polyvinyl resin and a 30 minute pressure requirement, it is possible to turn out approximately 4,000 to 5,000 sq. ft. of ¾" plywood per eight hour day, using a crew of three men. This is in contrast to the five man crew needed for the press operations when clamped bundles are used. This labor saving is claimed to more than offset the higher costs of the polyvinyl resin adhesives.

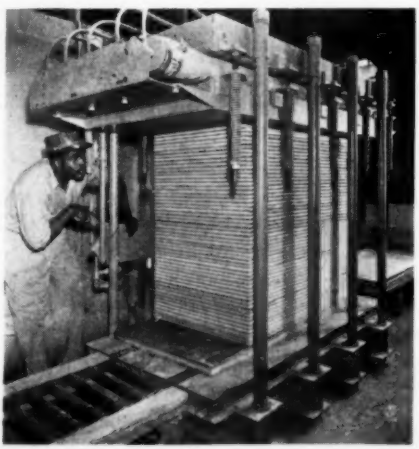


Fig. 6. Pneumatic plywood press closed.

It is well recognized that there are several competent makers of polyvinyl resin adhesives, and the writer holds no brief whatever for or against any of their adhesive products. However, it happens that the factories surveyed were using one type. The competitive situation in supplying glue for woodworking is much too intense for any major user not to have access to more than one competent supplier. The products and processes described and illustrated may, therefore, be considered representative of the products of any competent glue supplier, who has had an adequate background of experience in the industry.

TOOLING PROBLEMS

While the plastics are easier to cut than the metals, they are more difficult than the species of wood commonly used in plywood. Hence harder tool steels are required for saws, cutters and boring tools. Even standard high speed

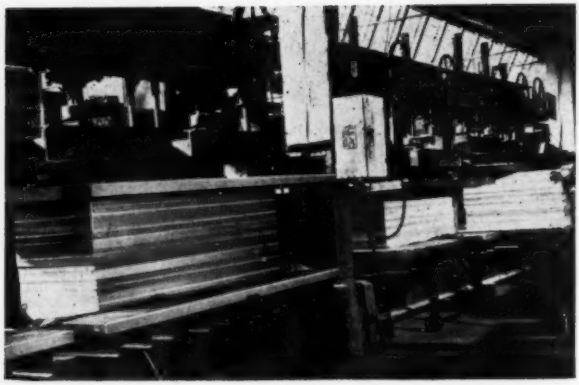


Fig. 7. National Vanity Co. uses screw pressing package to process 15 tops.

tool steels will give a very short working life. Carbide tipped tools overcome this difficulty and, when properly designed and used, will keep sharp for many hours of clean cutting. Details of tooth design and operating speeds should be obtained from well recognized makers and suppliers of such equipment.

ASSEMBLING PLASTIC-PLYWOOD

The plywood used as the center layer of these plastic tops is usually ⅝″ thick, all veneer construction, 5- or 7-plies, trimmed and sanded. Much of this plywood comes from the south, using cottonwood, tupelo or gum. Some is imported from the Baltic countries of Europe, usually of native birch, which is somewhat softer than the American birch. If Douglas fir plywood is to be used, special care must be exercised to adequately mask the grain figure, which can be done by scraping or planing, rather than sanding. The grade of plywood must be sound or better, being certain that there are no transferrable defects on the surface under the plastic. The back layer, for the purpose of making a balanced construction, may be 1/8″ or 1/10″ hardboard, of the Masonite type.

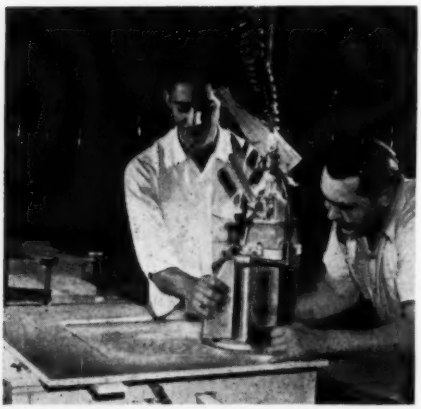
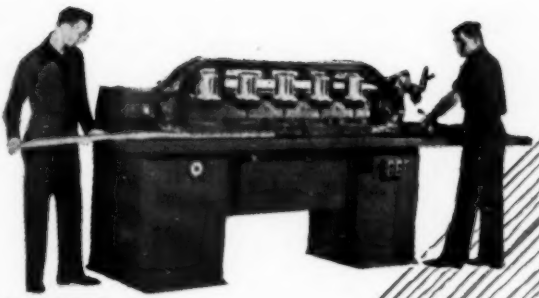


Fig. 8. Making a cut-out with a portable router at National Vanity.

So far it has not proved practicable to attach the plastic layer when the plywood is glued. There are technical reasons, but the major one is that of location. Most of the plastic laminators are located near to their customers to allow prompt truck deliveries of special orders, while most plywood plants are situated near the source of the timber, and often far distant from the ultimate markets.

The adhesive is applied on both sides



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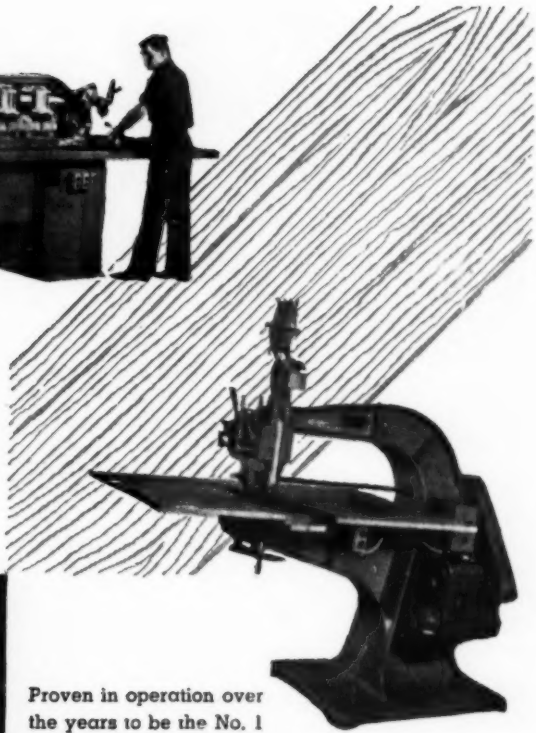

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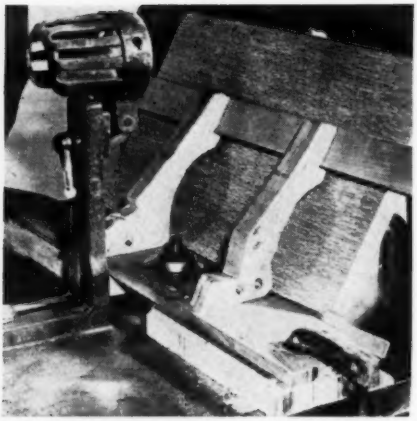

Fig. 9. Shaper setup for machining edges.

of the plywood center, using grooved rubber roll spreaders, as illustrated in Fig. 1. The drum of fresh adhesive is mounted in a cradle above the spreader and feeds directly to the spreader rollers. The rate of spread was estimated to be one half to three quarters pound of liquid glue per top, about 4′ x 2′ in size. This is equivalent to 30 to 45 pounds of liquid glue per 1,000 sq. ft. of single glue line, as it is usually computed. Note that the workmen do not require protective rubber gloves, as is the case with many of the glues and adhesives currently in use.

In the lay-up operation two illustrations are shown, Fig. 2, where the glue coated plywood is moving from the spreader to the lay-up rack; and Fig. 3, showing how the plastic faces are turned, so that the figured surfaces are together, and thus economically handled in pairs. It is to be noted in Fig. 2 that the underside of the plywood is in sight, showing a considerable number of defects, which are of no consequence, since this is the side that goes against the hardboard back, a pair of which are shown on the lay-up rack at the right. Fig. 3 illustrates the turning of one plastic face against its neighbor. Both plastic faces and hardboard backs are so reversed in opposed pairs to reduce handling labor. This procedure also makes certain that no defects from the back can be transmitted to the adjacent face of the next assembly, as might be the case if laid up in normal sequence. The lay-up time for 40 tops averaged 12 to 15 minutes, well within the limits established by the adhesive manufacturer.

One type of press for these plastic-plywood assemblies is shown in Fig. 4. The squeeze-out of the beads of glue can be clearly seen in some cases amounting to a distinct drip, which is assurance that enough glue has been spread. The double piston pump is shown at the left rear of the photo. At the right the operator is forwarding the preceding package on the roller conveyor leading to the machine room. Roller conveyors are used for infeed and outfeed, and are also on the lower bed of the press. This press has a large

Fig. 10. National Vanity spreads glue by squeezing a rubber bulb.

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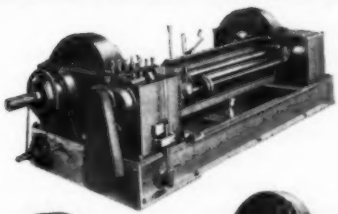
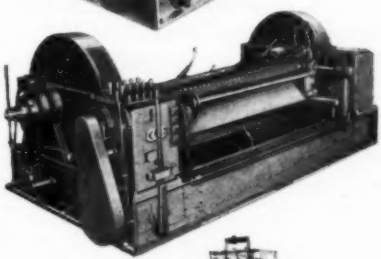


30" SWING lathes for small logs to economically produce veneer from timber that heretofore could not be used. Extra veneer can also retrieved from larger lathe cores formerly discarded.



50" SWING lathe built to machine tool standard for precision cutting at spindle speeds up to 100 rpm or even more. This lathe has found wide acceptance in all branches of the veneer and plywood industry.

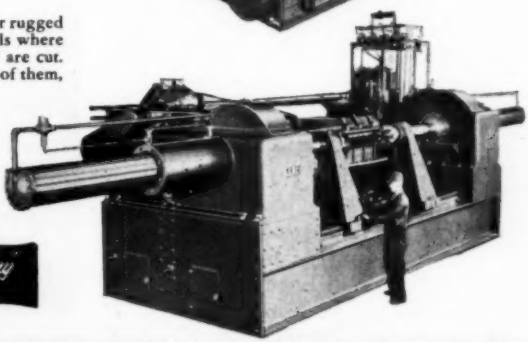


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Fig. 11. Grooved edges in sets of dinette table tops at York Plastic Products.

central hydraulic cylinder below this bed. The conveyor rollers on the press bed are mounted on springs, which are calibrated so as to be inoperative when pressure is applied.

The specific pressure on the plywood in this operation was 60 lb., and the pressing interval was 35 minutes. This is long enough for the "Wood-Lok" to secure its initial grip, so that pressure can be released. Since there are 8 to 10 packages on this outfeed conveyor, the elapsed time before unpiling and machining is from four hours up. In emergencies it is claimed that machining can be done after two hours, with no apparent weakening of the glue joint.

Another type of press for this work is shown in Figs. 5 and 6. This is a recently developed design, using compressed air, which is available in almost every woodworking plant. This eliminates entirely the hydraulic pump and its attending complications. Five runs of inflatable rubber lined fire hose, 4½" inside diameter, are placed between the two upper head plates, both 8" thick for stiffness. These hoses are kept deflated by suspended springs as shown in Fig. 5, and the press has its maximum daylight opening, as it is called. When these hoses are inflated with compressed air, the lower head plate bears on the plywood package, and the pressure is distributed uniformly over the entire area of the plywood in the press, as is indicated in Fig. 6.

Fig. 12. Dinette tops in sets, with metal edgings, at York Plastic Products.

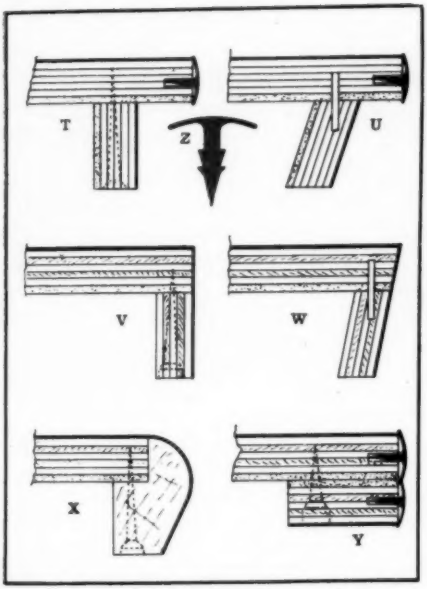

Fig. 13. Cross sections of edge moldings and aprons.

T. Drop apron, matching top, with metal edging.

U. Slanting drop apron, matching top, with metal edgings.

V. Deep edge, square, plastic faced.

W. Deep edge, angling, plastic faced.

X. Deep edge, with curved "wrap around" of plastic.

Y. Metal edged, double thickness.

Z. Enlarged sketch of molding, showing barbs on fin.

This photo shows the operator at the control valve, admitting 80 lbs. pressure, although 100 lbs. is available in the factory supply lines. The amount of specific pressure transmitted to the plywood depends primarily on the area of contact of the hose on the head plate. The flatter the hose the greater this area of contact, hence it is desirable to build the package up to the maximum that can be pushed into the press. If half of the possible hose area is in contact, an average of 40 lbs. would be available at the head plate. If the area of the plywood is less than that of the head plate, this specific pressure would be increased. It was estimated that some 50 to 60 lbs. specific pressure was used in this setup. The lay-up time was 20 minutes and the pressing interval 35 to 40 minutes. Note that if careless operation permits the inflation of the hose to be nearly complete, the actual contact area will be small and the resulting specific pressure may be entirely inadequate for good work and strong joints.

Still a third type of press is illustrated in Fig. 7, where the head of the press is a long "I" beam, permitting the gluing of either relatively short table tops, in packages, as shown, or of pressing long counter tops. This pressure is exerted by heavy screws, manually operated.

While such screw pressure cannot be accurately computed, the uniformity of the squeeze-out beads of glue is a reasonably good guide.

MACHINING PLASTIC-PLYWOOD

If the plastic-plywood table tops are to be rectangular in shape, they will usually be trimmed on standard saw tables, using saws that will cut the plastic satisfactorily. In other instances, such as irregular curves or rounded corners, a band saw may meet the requirements. However, many plastic fabricators are finding that portable or automatic routers give the cleanest cut. They work from the plastic surface down into the wood, and do not tend to nick the plastic, as undercutting saws may do. Such a setup, with a portable router, is shown in Fig. 8, making a cut-out within the counter top. A similar method, with a guide

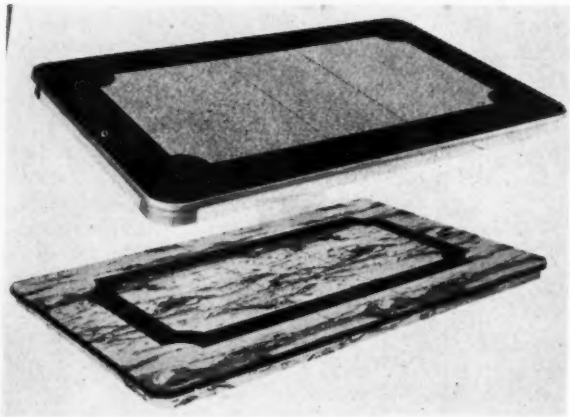

Fig. 14. Dinette tops with aprons by York Plastic Products.

plate pneumatically clamped to the the top, may be used for cutting the outside edges in various degrees of curvature. Carbide tipped bits are preferable for such edge cutting.

A shaper can be equipped with jigs for edge or end shaping or for chamfering, at any angle, as is illustrated in Fig. 9. This is particularly useful if strips of matching plastic are glued on the edges, requiring that the excess width be neatly trimmed off, and the corner slightly rounded, as is illustrated in Fig. 9.

Another method of applying polyvinyl resin glue to small parts assemblies is shown in Fig. 10. Here the glue is contained in a rubber bulb and forced out by gentle squeezing. This is handy for attaching edge moldings and general assembly joints. The workman appears to be gayly dressed to match the style of the plastic products on which he is working!

Dinette table tops are a major production item for most plastic laminators, and these are almost invariably edged for protective purposes, with a metal

Fig. 15. Modern occasional furniture with plastic tops by Kaufman Furniture Co.

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Fig. 16. Dinette suite with table and chairs by Hy-Light Plastics.

or plastic molding. These moldings have a fin on the back, which can be forced into grooves in the edges of the tops. Such grooves are cut with a router, similar to that used for trimming the edges, and can be noted in the sets of table tops and leaves in Fig. 11. These moldings are cleverly pushed into the grooves by a simple device, having a rotating bed on which the plastic table top is firmly clamped by an air jack. As the table is rotated by the operator, a pneumatic ram with rubber roller, forces the back fin of the molding into the grooves, and even follows the contour of round corners. Surprisingly sharp bends can be made without cutting away the back fin.

A stack of dinette table tops, after edging with nickel plated moldings, is shown in Fig. 12. These metal edge moldings are a bit concave, and extend very slightly over the upper and

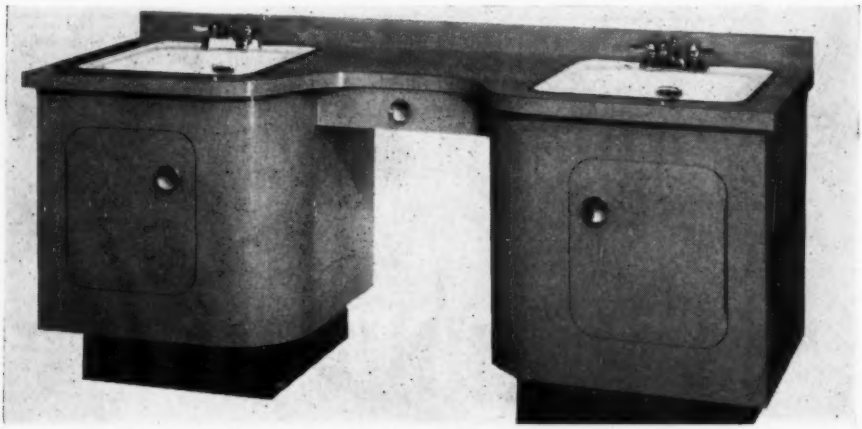

Fig. 17. Twin lavatory cabinet by National Vanity Co.

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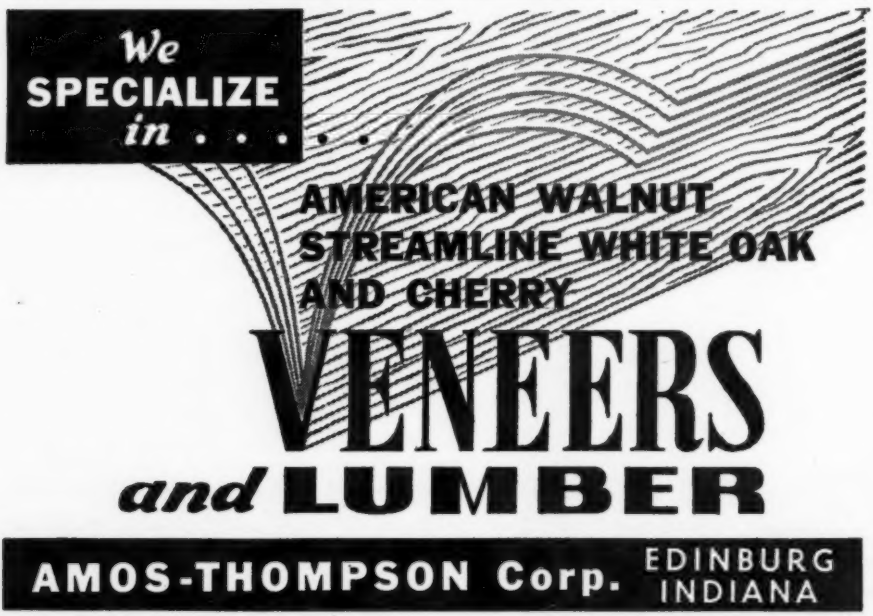
lower surfaces of the plastic table top, in order to guard against chipped corners. Some of these tops have square ends with substantial rounded corners, others have a concave end, and still others a convex rounded end with small corners, about 1″ radius, as can be noted in the photo.

It is the custom of many of these dinette table top manufacturers to add a decorative apron, rail or skirt under the tops, since these frequently match or are in contrast with the plastic top, and can be most economically supplied and attached by the top makers.

Several of the methods of attaching these edge moldings and aprons are shown in the cross sections of Fig. 13.

The fin, or tongue, on these moldings is provided with barbs, that push in far more easily than they can be pulled out, as is indicated by enlarged sketch Z. The aprons in T and U are of the same plastic-plywood combination as used in the top itself. They are screwed or splined to the underside of the top. The aprons in V and W may be made, optionally, of solid wood or waste plywood strips. The edge plastic is glued in place after the apron is attached to the top. The top corner, where the plastics overlap, is very slightly rounded. The making of X involves bending down and gluing extensions of the plastic layer of the top, over the curved apron, and is a time consuming job that can only be justified on tops in the higher price brackets. Sketch Y is a heavier and wider edge molding of metal, which is especially intended for public eating rooms.

A few illustrations can be shown of these plastic-plywood tops, either as



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they are partly finished ready for the legs or pedestal, or as they have been completely assembled, ready for the market place.

The apron equipped tops, shown in Fig. 14, need only legs or pedestals, and are usually sold in sets with chairs of appropriate design. These aprons may be vertical or angling, plain or scalloped, and often have rounded metal corners, as shown in the upper photo of Fig. 14.

A group of occasional tables, with plastic tops and metal legs is illustrated in Fig. 15. These are of knock-down construction for easier packaging and less costly transportation.

A complete dinette suite, with table and chairs is illustrated in Fig. 16, the table edges having the round "wrap over" plastic effect as shown in the cross section detail of Fig. 13-X. The table has folding metal legs, with a removable leaf, that will reduce it to a square shape. The chair cushions are of plastic to harmonize with the plastic table top.

An example of a custom-made built-in cabinet is shown in Fig. 17. This is in the modern mode of providing "his and her" lavatory in the home bathroom. These round corner cabinet bases are usually made by saw slotting the plywood back, and pressing the assembly in pairs of mating forms.

CONCLUSIONS

Such a survey as this can only touch the high spots, but enough has been shown to demonstrate the versatility of plastic-faced plywood. It provides a hard sanitary surface and opens up a wealth of color effects that are part and parcel of our modern designs. It has definitely broadened the field of plywood utilization. Fortunately, for the lovers of beautiful wood, it need not displace the standard and classical designs of furniture, which have graced our homes for centuries.

• • •

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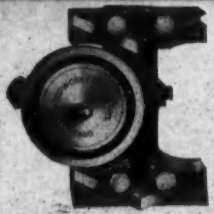
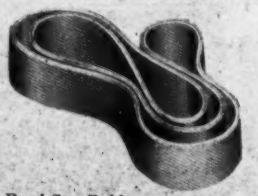
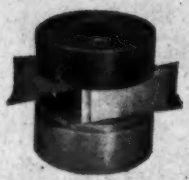


Band Saw Guides



Band Saw Rubbers



Ball Bearing Collars

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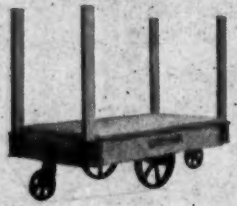

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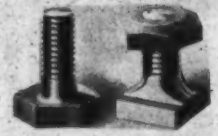

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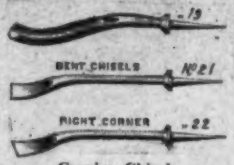

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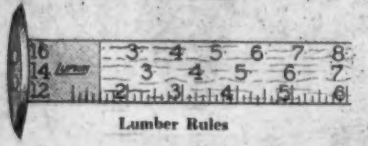

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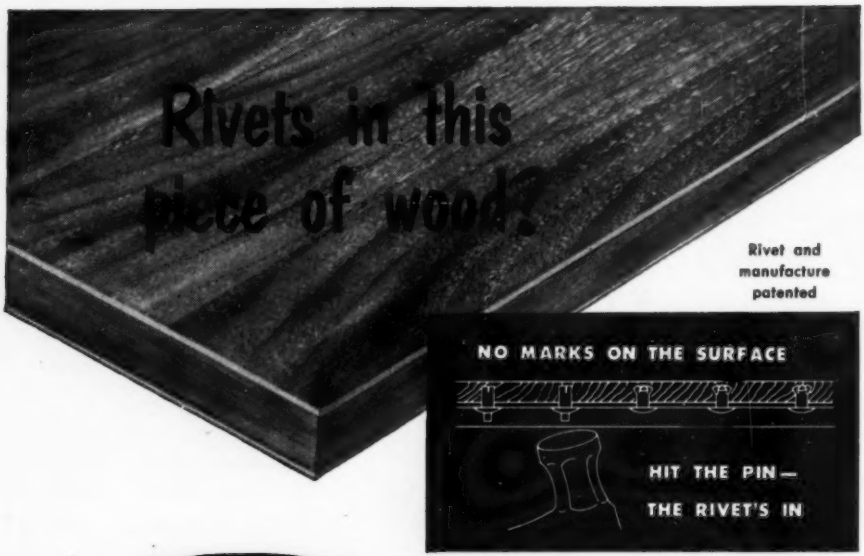

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Fundamentals of WOOD MACHINING

By Carl Chekouras

AFTER the basic operation, that is cutting the logs, they are then transported to the sawmill where wood machining begins. In most instances, the logs are stock piled according to their grain and dimensions. Many sawmills have a pond wherein the logs are selected and guided to a conveyor for carrying into the mill. If a pond is not used, the logs are conveyed by lift trucks or jammers to the mill.

In the sawmill, there are two types of saw machines. Some mills use the circular saw. This is very common among the smaller mills. The circular saws range in sizes from the smallest, a tractor-powered machine carrying a 30″ saw blade, to a large steam or diesel-operated mill having circular saw blades of diameters as large as 100″.

The band sawmill has a similar type carriage for carrying the logs past the saw blade, but rather than having the large circular saw blade, it has a large band wheel below and above the saw carriage, and the band saw blade operates in a vertical position, the cut being downward.

The band sawmill is used when conservation of material is more necessary, such as cutting the more valuable hardwoods; also in the case of high production mills where the fast speed rates are important.

A band sawmill is also more qualified when a large variety of diameters are to be cut, as it is most adapted to the various sizes that are to be machined. A circular sawmill frequently is fitted with a gig, or top saw, Fig. 3, which is another smaller size saw blade on a horizontal shaft operating in line with a large blade, that makes up for the large dimensions that the regular blade does not quite cut through.

After the logs have been sawed into dimension stock, they are then advanced through an edger, Figure 4, which cuts the boards into a predetermined width. The boards are then advanced to a transfer chain, and their motion is changed—the board now travels perpendicular to the conveyor, and through trimmer saws, Figure 5, that cut the stock to the desired length. Some of the more advanced trimming machines cut the stock into lengths as well as cut out the knots and other flaws.

When a sawmill is not equipped with a modern multiple blade trimmer, the stock has to be passed through trim saws that are individually operated for

Fig. 1. A log ready to "roll" onto the saw carriage.

cutting out the knots and defects. The stock is then advanced to a position where it is sorted according to grade and sizes.

RESAWING

In most instances, the high production mill cuts the stock to a functional thickness so that it can be resawed into the final thickness through another machine. This is one case where the selective material is made into boards. The lower graded material can be used as dimension material, but would be unqualified if resawn to 1″ boards. The resaw is also used to manufacture siding or thin box shook. It would be too costly to manufacture thin stock on a sawmill wherein the saw cuts too much of a kerf. A band resaw cuts considerably less kerf than a sawmill. In some instances, the resaw used is a circular type (Figure 7). Although the circular resaw consumes more stock than a band type, it is an advantage to have such a machine when short runs have to be manufactured of a given dimension and the dimensions are such that the amount of kerf removed does not interfere with its economy. For instance, if a 4x4 were to be resawed to two 2x4's, it could just as well be machined on a circular resaw, as the amount of kerf allowed is so great that two full 2x4's can be made by resawing a 4x4.

Fig. 2. After the log is on the carriage, the kicker, (shown about center), turns the log to position and holds it back for the "dogs" to grip it.

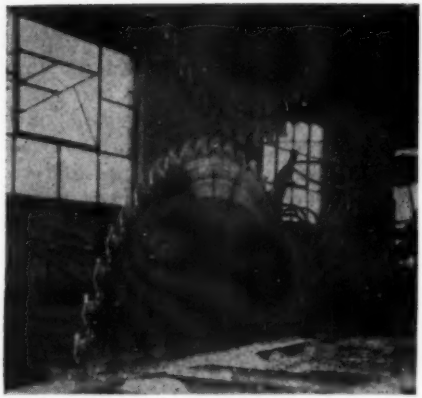

Fig. 3. Circular mill with top saw.

Fig. 4. Edger can be used for edging or multiple ripping.

In localities where the cutting produces a clear rough dimension stock, it can be conveyed through a gang saw, Figure 9, that cuts the stock into many pieces simultaneously. It is a very efficient machine, but should not be used where random cutting is prevalent, as the setup is primarily for a large run of one dimension.

One of the functions of resawing is to produce boards from dimension stock. If the sawmill were to cut the log into boards, it would require an extra handling. As stated before, the stock can be cut into 2" dimension, and run through the resaw for cutting in two boards (Figure 10).

Another function of the resaw is to cut stock into rough dimension for molding mills or for the manufacture of wood parts. It would be more economical if a mill that has need of 2½" square pieces were to have them manufactured at the sawmill, rather than try to cut the timbers to such sizes at the molding plant.

The same would apply to cutting sticks such as lathe and stacking strips.

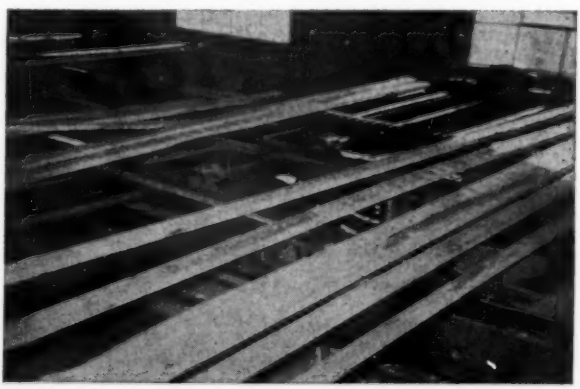

Fig. 5. Boards conveyed past trim saws to be cut to length.

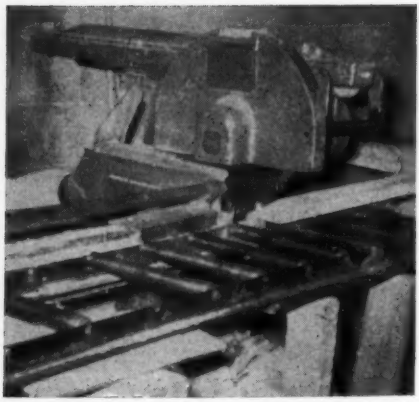

Fig. 6. Typical hand operated trim or cut-off saw.

This material need not be of such grade as that to be molded, and also it is of such lower market price, that it must be produced rapidly and economically. The best method of producing such sticks would be in the resaw section of a sawmill. Another machine found in a sawmill is a refuse saw that cuts up the odd rippings so that they can be conveyed to the hog or the burner.

COMBINATION PLANER AND SAW

In the manufacture of boards and other dimension stock, the next operation after sawing is that of planing. A machine has been manufactured that combines both the circular resaw and planer, and is sometimes very economical in producing such items as bevel siding. (See Figure 11.) The band saw is a horizontal machine mounted directly at the out-feed end of the planer and as the stock is fed through the machine, it is also fed through the band resaw that splits it into the desired dimension and pattern.

Other types of resawing on a planer can be accomplished by the attachment of saw collars on the profile spindles of a matcher (Figure 12). A mill that is producing 2″ dimension could be set up for the manufacture of 2x12's, and having two saw collars mounted on the profile heads, they could then adjust the profile heads down so that 2x4's, 2x8's, or 2x12's can be manufactured in the same run. The saw collar method on a profile of a matcher can be successful, as it would be more economical than to cut the 2x12's into 2x4's or 2x8's, and then to remachine them by running them through the matcher for the second time.

There have been instances where a

Fig. 7. Circular resaw cutting 4″ stock.

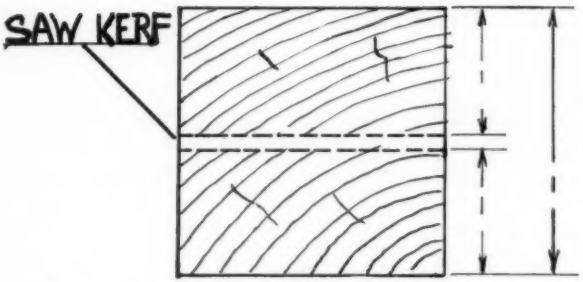

Fig. 8. A 4x4 provides plenty material for thick saw kerf.

combination circular saw attachment has been fixed to a planer matcher primarily for producing diagonal cuts as the machine is cutting the stock to dimension size.

RIPPING

After the stock is cut to the functional width and thickness and, in many instances resawn, it frequently has to be ripped into functional sizes for future uses. In some cases, the exact width is ripped on the edger but in the other cases, the advantage of stock saving is to rip the stock on a ripping machine after it has been resawn and planed. In the manufacture of such things as tent stakes, box cleats or fence pickets, it is definitely noticeable that a multiple rip saw, Figure 13, would not only save money, but increase the output considerably.

When random width stock has to be used along with other pieces such as in glued-up fabrications, or in selective ripping, it is then advantageous to use a straight line rip saw. (Figure 14). Of the straight line rip saws, there are two types: the spur type, having a set of spur rolls to feed the stock through the machine. The other type has a chain bed that holds the stock firmly as it is fed in a straight line regardless of the contour of the edge. In straight line ripping, many methods of economy are employed to get the most of the material. One of the common methods of selective cutting is that of using a guide light. This is a light that hangs

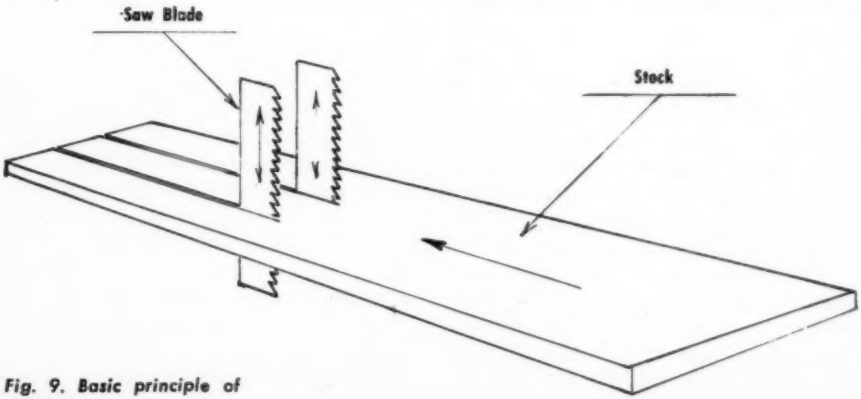

Fig. 9. Basic principle of gang saw.

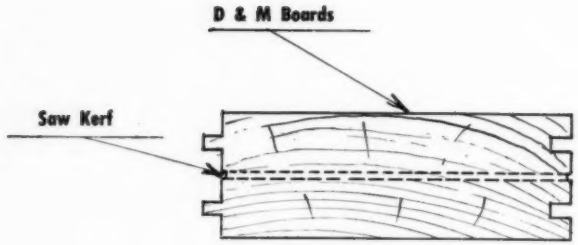

Fig. 10. Cutting tongue and groove for resawing.

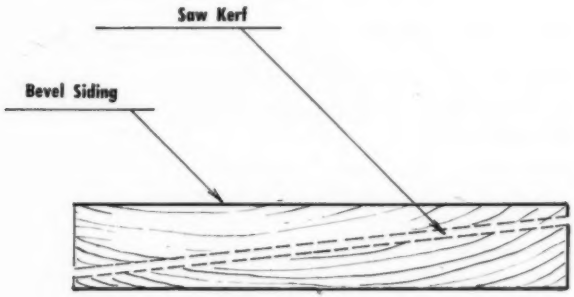

Fig. 11. Method of producing bevel siding.

over the in-feed end of the machine and casts a thin dark shadow, indicating where the saw will cut when the stock is advanced into the feed rolls. By using a guide light, best use of the material can be seen before the cut is made.

A straight line rip saw is often used in cutting functional dimensions such as required in sash and door, or molding plant. (See Figure 15.) The saw operator may be cutting stock to be used in 1⅛" thick sash, and the stock could be cut from random dimension shop grade material. The required stock in sash and door manufacture has so many varied lengths, an operator can get the most of the stock by cutting the long pieces from the clear section of the stock and the short pieces in between the knots. The straight line rip saw also can be employed in salvage cuts, wherein the material that has been disqualified from one department or one shop is shipped to another shop where it can be salvaged and made into a usable stock. For instance, the material required in the manufacture of sash and door could leave an amount of ripping that could be cut into material for use on such items as box cleats, fly swatter handles, low price rulers, etc.

CROSSCUTTING

Although the previous portion of this chapter is concerned with many different ripping operations, the various cross-cutting operations are more numerous and require more different machines than does ripping. The first or basic cross-cutting operation is that of trimming which is the operation that cuts off the rough ends of the stock, and trims the stock to a desired length. The type of blade used in trimming is similar to that of cross-cutting, except it is a higher produc-

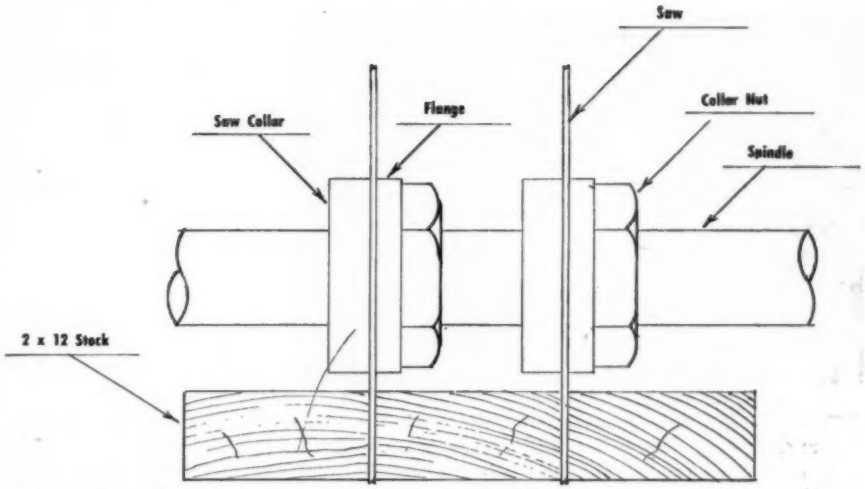

Fig. 12. Saw collar set up for profile spindle of matcher.

tion, and rougher cutting blade, designed primarily for production rather than finish.

The ordinary table or variety saw, which is the most common woodworking machine in use today, is a type of machine that is called upon to do most cross-cutting work. As we advance further in the uses of material and the different applications of wood-machining, the necessity of cross-cutting becomes more prevalent and the various applications more numerous. Figure 16 points out the main parts and functions of a variety saw, and is self explanatory.

Most shops have, somewhere in their premises, a radial, or swing cutoff saw, or an automatic cutoff saw. In all three cases, these machines are such type that the stock is conveyed or is slid on a table to where the saw is moved

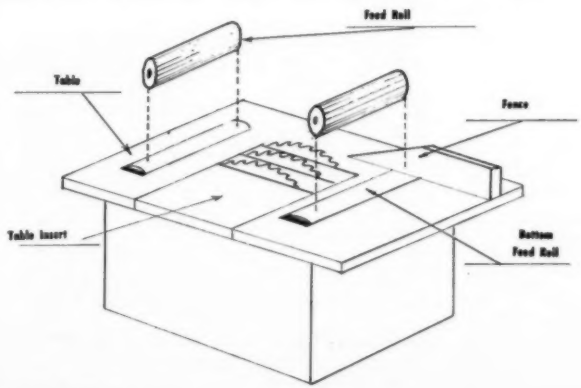

Fig. 13. Basic idea of a multiple rip saw not showing motor and feed works.

Fig. 14. Chain bed straight line rip saw.

across the stock, cutting the required dimension. (See Figure 6.) The advantage of having this type of machinery is primarily for cutting original stock. The stock would be too long to handle if it were to be moved across the table of a variety saw.

A tenoner, as well as an end matcher, is equipped with trim saws for cross-cutting the end of the material to control its length and the length of the tenon being machined. Figure 17 illustrates the function of the trim saw on a tenoner, or an end matcher.

A machine similar to a double end tenoner called a double end cutoff saw, is employed where high production of certain length pieces is necessary and the finish cut is to be smooth. The double end cutoff also assures the end to be perpendicular to the lineal dimension of the stock. An interesting application of a specialized double end cutoff is a machine known as a panel-sizer, which, as the name implies, is employed primarily for cutting panels to certain sizes. In the manufacture of case goods or panel doors, a manufacturer uses a panel sizer to cut the pieces of plywood to equal dimensions and perpendicular sides. The panel sizer also has to cut very accurately as it would be undesirable to have rough edges on plywood panels, especially those that are not hidden in a groove such as the bottom edges of a dresser or chest of drawers.

Although a dado head is employed

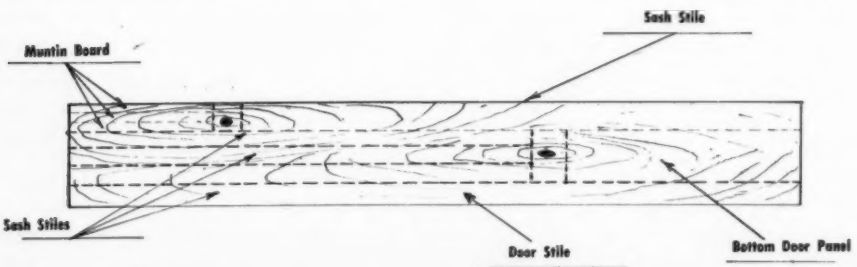

Fig. 15. Cutting functional parts utilizing nearly the entire stock.

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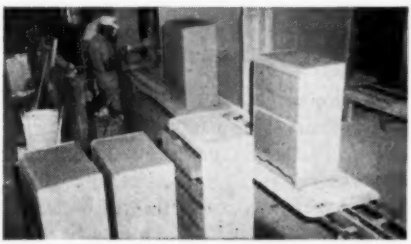

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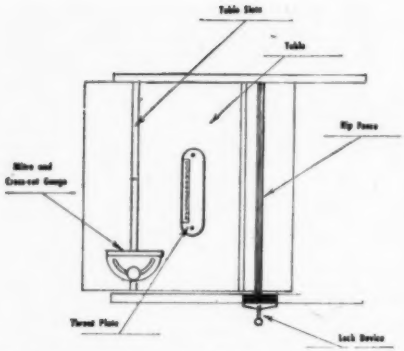

Fig. 16. Top view of a table or variety saw.

frequently on a variety saw, there are machines manufactured to cut dadoes only, such as in the manufacture of shelf stock where a series of dadoes are to be cut and production to be observed. Many double end tenoners are fitted with dado arbors that, while the double end tenoner cuts the material to size, cut the shelf grooves or dadoes at the same time.

In a moulding mill, a small hand operated saw is used to chop out the defects, and this machine is sometimes called a chop saw. This machine is equipped with a fine, smooth cutting mitre blade, as it is desirable that the trim or molding being cut to size, is square and smooth.

In discussing the various applications or machinery for cross-cutting, we cannot overlook the ever-popular hand electric saw. In this day of modern machinery, a carpenter would not think of trimming the edges of roof boards by hand when such increased production can be accomplished by the use of a hand electric saw. The hand electric saw is also used for many other cuts and can be equipped with a type of saw blade required for the work.

Cross-cutting saws are used on other special machines, such as mitring machines, combination dowel and mitring machines, and many others. The many applications of special cutting cross-cut saws are such that a volume could be filled discussing cross-cutting saws alone.

CUTTING MITRE

Of the many saw operations, much concern and study is given to the cutting of mitres. A mitre cut is of great importance as in all cases the mitre cut is such that it shows up on the finished product, and must be free from chips or tear-outs. The saw blade used for cutting mitres is similar to a cross-cutting smooth trimmer saw, and in many instances the same saw blade can be used for both smooth trimming

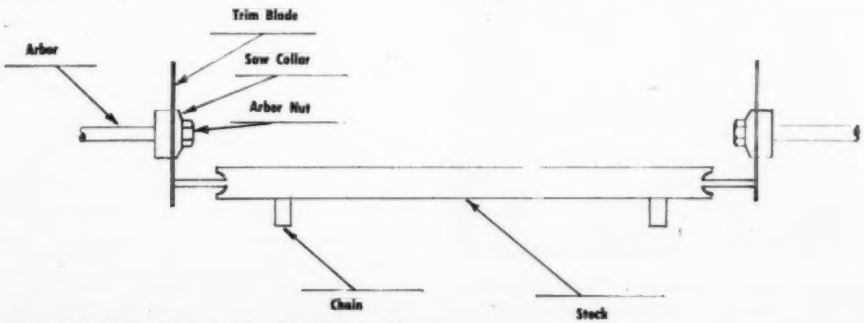

Fig. 17. The function of trim blades on a tenoner.

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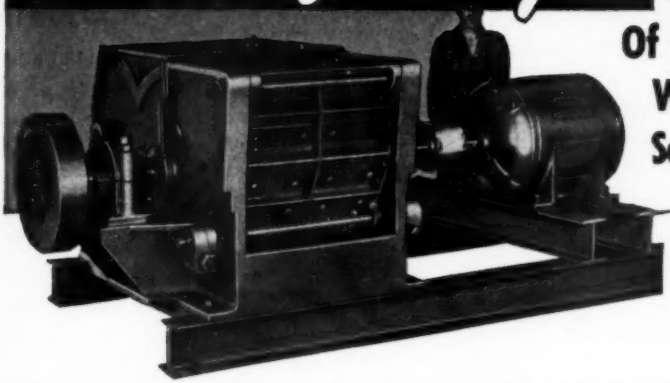

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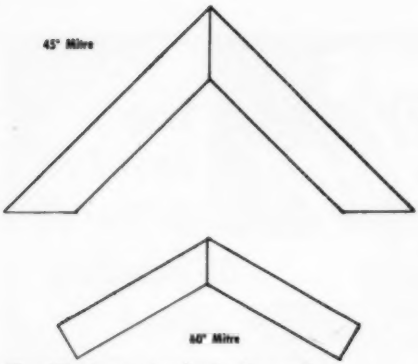

Fig. 18. Some standard mitre cuts.

and mitring. There are machines primarily designed and built for mitring, but in many cases, production mitring can be accomplished on many other sawing machines.

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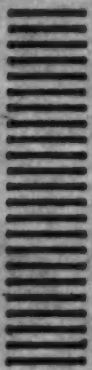

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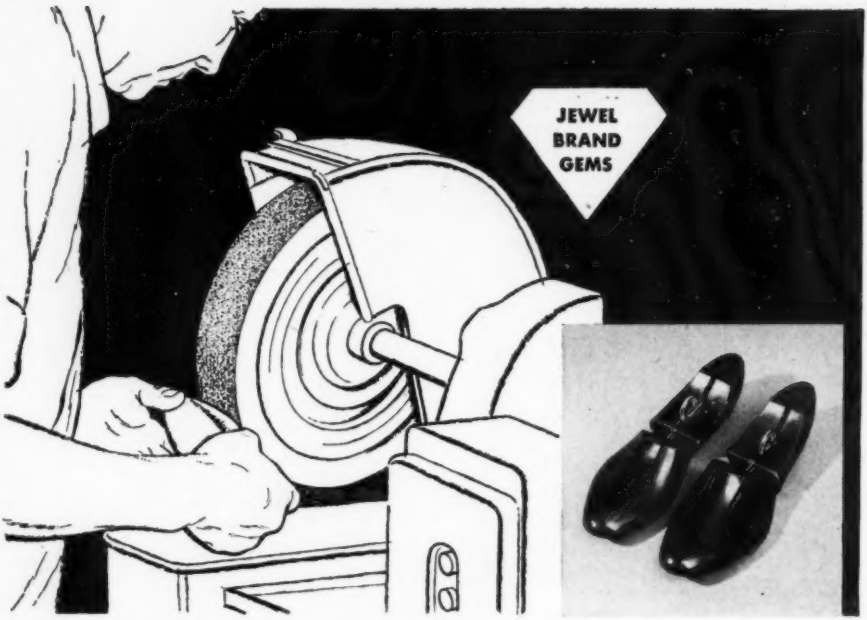

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FURNITURE FINISHING

Part 7

By

HAROLD B. GATSLICK

THE filler is often considered "the foundation of a fine finish." Many of the principal cabinet woods have large pores and these must be properly filled in order to assure the desired final finished effect. Conifers and diffuse-porous woods are generally finished without the use of fillers, but occasionally these woods are filled to equalize absorption of different surface areas.

Good body or depth of finish is required today on most furniture made for the home. The recent demand for a furniture finish of great depth and high polish on modern design furniture requires a smooth, mirror-like surface, and open pores or partially filled pores detract greatly from its appearance.

The main function of a filler is to fill the open pores and provide a level surface for the subsequent topcoats. Secondarily, a filler serves to impart color to the pores and thereby emphasize the grain. Fillers are also employed on exposed end grain to prevent absorption of the topcoats.

Wood fillers may be classified into two general types: (1) the paste filler, which is transparent or opaque, used on open-grained woods, and (2) liquid filler which is generally transparent and used for the close-grained woods.

The types of fillers used on the more common furniture woods are shown in Table 1.

Paste Fillers.

Paste wood fillers consist essentially of a non-absorbing base or pigment, a non-volatile vehicle and binder and thinners. Translucent inert pigments include silex, silica and the silicates and carbonates of calcium and magnesium. Color pigments, which give the desired color to the filler, may be any of the many organic or inorganic pigments available. The vehicle binders may be vegetable oils and special varnishes or japan driers.

In order to effect the desired result, fillers must be formulated so that they will: (1) sink in and fill the pore; (2) have minimum shrinkage and swelling properties; (3) provide good adhesion to washcoat or stain undercoat or bare wood; (4) be easy to apply and wipe; (5) have sufficient viscosity to prevent entry of air into the pore; (6) dry uniformly and rapidly.

Paste fillers may be divided into the old or conventional slow-dry filler and the relatively new synthetic quick-dry fillers. The old type has a linseed oil

Table 1 KINDS OF FILLER USED ON VARIETIES OF WOOD[1]

Pores invisible to the eye. Paste filler not needed. Use liquid filler or shellac.[1]	Pores small but generally visible. Paste filler sometimes used. Liquid filler or shellac generally used.	Pores large. Paste filler usually used. Liquid filler unsatisfactory.
Basswood	Basswood (sometimes)	Ash
	Beech	
	Birch	
	Boxwood	
Cedar, red and white	Cherry	Butternut
Cucumber		
Cypress	Cypress (after water-stain)	Chestnut
Ebony		Cocobola
	Cottonwood	Coffee Tree
Fir (including Douglas)		Elm
	Gumwood	Hackberry
Hemlock		Hickory
Holly		Locust
Larch or Tamarack		Mahogany
Magnolia		
	Maple, hard and soft	Mahogany, Philippine
		Oak
		Osage Orange
		Rosewood
Pine, white and yellow	Sycamore	Sassafras
Poplar or Whitewood		Satinwood
		Sycamore
Spruce		Vermillion
Tupelo	Redwood	Walnut, black
Willow		Walnut, Circassian

[1]By permission from "Coloring, Finishing and Painting Wood" by A. C. Newell. 1940. The Manual Arts Press.

base, whereas the synthetic or quick-dry has a rubbing varnish or lacquer base. Although linseed oil has good wiping properties and expands on drying, which aids in complete pore filling, it is slow drying and does not adapt itself to many of the present day finishing schedules.

The quick-dry fillers, which are formulated to dry in from 10 minutes to several hours, presented a rubbing or wiping problem which has been fairly well eliminated by proper solvent balance. A controlled amount of slow-drying solvent is required to give good wiping properties. If slow-drying solvents are not incorporated, rapid solvent evaporation in warm weather may affect moisture condensation and result in blushing.

Paste filler is usually made from silex or some other finely ground rock base. Silex is a form of silica made by crushing a dull-colored quartz rock called flint. Silica is obtained from ordinary quartz but does not give the wedges, needles and spherical-formed particles obtainable with silex. Silex also gives greater transparency when mixed with oils, and the degree of clearness and transparency depends to some extent on the fineness of the particle size.

Prior to the use of quick-drying paste wood fillers, the older type linseed oil-silex filler required a 24- to 48-hour

drying period before lacquer or varnish applications. The quick-drying paste fillers of the past decade are designed to be sufficiently dried to re-coat with lacquer in three to four hours.

The fast-drying synthetic fillers have been formulated primarily for reduced finishing production time. As the dry-

Courtesy E. I. duPont deNemours & Co., Inc.
Brushing in the filler.

ing time is decreased, the wiping or padding operation becomes more difficult and a compromise between fast drying and difficult wiping must be accepted.

Old-type wood fillers vehicles consisted chiefly of raw or boiled linseed oil. Small quantities of japan driers and anti-settling agents generally were added to the formulation. A large proportion of commercial fillers still contain essentially the same ingredients and are usually referred to as "orthodox" types. Linseed oil vehicles were essentially replaced, either wholly or partially, by varnish-type vehicles, synthetic resin vehicles, or combinations of these.

Linseed oil is still found in many fillers in a small proportion because of its property of wetting the wood and enhancing the grain. Because of its slip, the wiping properties of fillers are improved. Linseed oil fillers will yellow when kept in diffused light or complete darkness and will bleach out again on exposure to light.

Flash-dry fillers are usually formulated at very low vehicle or binder level and the solids are carried principally by the solvent. The very low vehicle level minimizes any yellowing effect; usually these fillers are based on non-yellowing or nearly non-yellowing synthetics. The use of white lead pigments in fillers for light colored finishes could easily result in discoloration. Since most organic films are quite permeable to gases because of sub-microscopic porosity, even slight traces of hydrogen sulphide can affect discoloration of the white lead pigments.

Liquid Fillers.

Liquid fillers are used on medium- to low-quality work made of medium close-grained woods. They are generally a varnish with a small amount of a non-absorbent base material. The non-absorbent base for liquid fillers is a coarse material such as silica or cornstarch, china clay, kaolin (aluminum silicate hydrate), whiting (calcium carbonate), magnesium carbonate or talc.

Some finishers use several coats of shellac as a liquid filler, rubbing each coat down to bare wood fiber to remove all shellac except that in the pores. White bleached shellac occasionally is used for filling to produce natural and light colored finishes, whereas orange shellac is used for the darker finishes. Shellac is considered a good filler, but

does not provide a good foundation for subsequent varnish coats. This is particularly true with synthetic varnishes.

Stain Fillers.

Combination stain-fillers are often used on medium- and low-grade furniture where woods such as pine, poplar, maple, birch, beech and gum are used. These filler-stains are supplied in paste form or ready to use. The most effective type incorporates light-fast acid and direct dyes with a synthetic quick-dry type filler and is handled the same as a normal filler. Some of these filler-stains are formulated to be recoated in 30 minutes after wiping.

Courtesy E. I. duPont deNemours & Co., Inc.
Padding the filler.

Special Fillers.

Wood imperfections, nail and screw holes, and other large cavities are commonly filled with water putty which is obtainable in several colors, and may be varied by the addition of dry earth colors. A wood filler-animal-hide-glue combination and stick shellac are also used in this type of filling operation.

Filler is one of the least profitable items from a paint manufacturer's standpoint, which explains to some degree why filler improvement has not kept up with lacquers, varnishes and stains. Most filler manufacturers recommend a neutral filler that will produce a filled pore with a transparent or translucent effect. The manufacture of such a filler can be better controlled and the problem of color variations is eliminated. Further, a neutral-colored filler can produce a harder filled surface.

Many manufacturers still recommend the use of the old-type, slow-drying filler since the quick-drying synthetic fillers generally do not produce the quality filling job obtainable with the former.

Many different japan driers have been used in filler manufacture. These are made from hard fossil gums, rosin, linseed oil and a suitable catalyst.

Filler Application.

A smooth clean surface is pre-requisite to a quality filling operation. The stock should be at the moisture content desired for ultimate use. Bare wood often fills better when sized, and stained wood should be washcoated with a low-solids coating of shellac or lacquer.

In humid weather, even though non-grain-raising stains are used, a washcoat would be recommended following the staining operation. This is true since the wood and some of the solvents employed in the non-grain-raising stain are hygroscopic and some grain raising normally occurs. Washcoats are used on bare wood before filling when it is desired to color the pores of the wood with a minimum staining of the protruding substrate. Washcoat not thoroughly dried before the application

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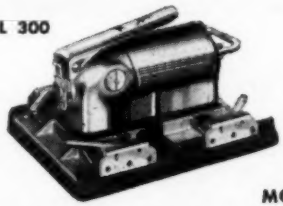

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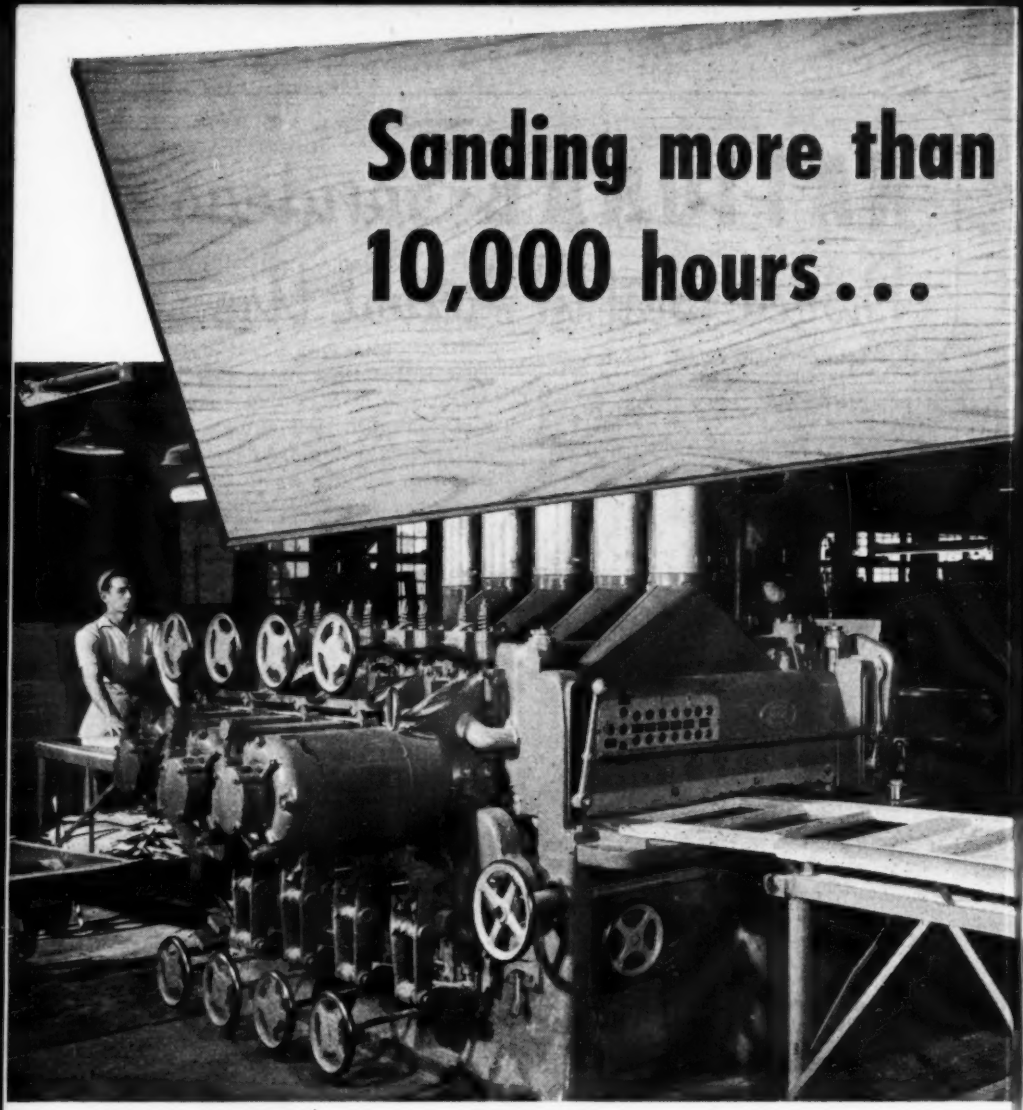

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of filler will pick up color from the filler and cause a lack of clarity in the final finish. Inadequate drying of washcoats may also cause difficulty in filler padding, and blistering and bubbling in the topcoats may occur.

Filler may be applied by brushing, spraying or dipping. Following the slightly excessive uniform application, the piece is permitted to flash from 10 to 20 minutes until the filler begins to harden and take on a dull or flat appearance. The filler is then padded into the pores by machine or hand cross-grain rubbing. Padding is effected by using a filler-moistened pad and wiping first across the grain in long straight strokes followed by small figure eight or circular strokes to evenly pack the pores.

The filler pad should carry a heavy deposit of moist—not wet—filler paste during the padding operation. The filling is then done by a shearing action in the paste itself and provides for a constant surplus of filler at the surface rather than a constant removal of filler as will occur if the pad is renewed or freshened too frequently.

Padding a porous wood with a heavy filler affects surface filling and leaves small pockets of air space at the bottom which can result in either pinholing or filler popping. A filler must be reduced to a sufficiently light fluid state and carried in a sufficiently slow solvent to flow into the furthermost recesses of the pore by capillarity and to thus displace all air. The figure eight padding motion packs and levels the mouth of the pore at the surface and cannot be expected to fill from the bottom outward.

Mineral spirits alone will provide good penetration and flow, but require a rather long flash time prior to proper padding conditions. VM & P naphtha or white gasoline is added to give a faster flash so that padding can be effected in a shorter time. Turpentine is good for penetration and working properties but necessitates a drying time of 24 to 48 hours.

If the filler is padded too soon, an excessive amount of filler will be removed from the pores, whereas an excessive drying period prior to padding will cause the filler to break off and not pad properly. A light final wipe along the grain removes the cross-grain padding marks.

Slow-drying varnish-type fillers normally require 12 to 24 hours air drying time. Quick-drying lacquer type fillers normally require 6 to 12 hours air drying time. Satisfactory forced drying may be accomplished in from one to two hours at 120°F. to 140°F. and 35% relative humidity.

Filler brushes should be quite stiff so that the bristles will be sure to enter the lowest part of the exposed cell cavities and also should be large with plenty of bristles to hold a large quantity of filler.

Picking sticks, about ¼″ to ⅜″ in diameter and 6″ to 8″ long, can be made from ample maple doweling or from close-grained hickory. These sticks are generally wedge-shaped on one end and pointed on the other for scraping the filler out of corners and other inaccessible places.

Brushing the surface with the grain with a stiff brush just before filling is recommended to remove loosened or broken fragments of cell walls.

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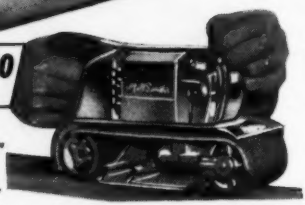

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WU-159

Material for rubbing or padding in the filler may be sea moss, sea grass, jute, flax, hemp tow, rags, burlap or cotton waste. Almost any material can be used which is somewhat absorbent and not too stiff and which will scrape or rub off the excess filler from the surface without digging it out of the pores. The use of a 10- to 20-power magnifying glass is suggested for examining the filler to see if it has been properly rubbed or padded. A light sanding of the grain with 2/0 or 3/0 garnet abrasive paper is recommended by some authorities after the filler has completely dried and prior to the sealer application.

In spraying, greater thinner reduction is required. It is recommended that the pressure tanks be equipped with agitators to prevent heavy pigments from settling. Because solvent evaporation is affected in the spray atomization, a shorter flash time to padding may be secured (five to ten minutes).

Fillers should be strained before being sprayed. Low air pressure of from 25 to 30 pounds at the gun with about 15 pounds tank pressure is recommended for filler application with minimum material loss. If the filler is sprayed from a gravity-feed bucket, from 30 to 35 pounds pressure at the gun is recommended. An E-tip and needle with a No. 30 air cap is recommended when using a gravity-feed bucket; and an E-tip and needle with a No. 704 air cap when using a pressure tank.

It is considered good practice to brush the filler across the grain with a long bristled brush immediately after spraying to more evenly distribute the filler.

A padding machine, consisting of

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felt blocks mounted on a slowly revolving wheel, reportedly does an excellent job of preliminary padding. This machine is moved back and forth across the surface while the revolving pads force the filler into the pores. Machine padding with the heavier portable hand rubbing machines has replaced hand padding in most filling operations.

In high-quality work and on particularly coarse-grained woods, a double filling operation is often recommended. Double filling insures thorough filling. The normal procedure is to apply a low-viscosity filler coat which is padded and dried, followed by a heavy filler coat applied in the same manner.

Fillers employed in varnish schedules may prove unsatisfactory for lacquer systems. Silex does not absorb oil or color, and since the solvents employed in lacquers do solvate the oil or color,

a faded-out appearance or graying effect may result, particularly when the filler has not been dried adequately. Grayness can be eliminated in lacquer systems by employing varnish fillers or by using non-bleeding colors in the linseed-oil-silex-type filler and allowing a minimum of 24 hours' drying time.

Solvents generally used for thinning paste wood fillers include VM & P naphtha, lead-free gasoline, mineral spirits, xylol or turpentine. Generally for brushing or dipping, 10 to 14 pounds of paste is used with each gallon of solvent. For spray application, 6 to 10 pounds of paste per gallon of solvent usually is used.

VM & P naphtha is the preferred thinner since it is fast drying and leaves no residue. However, plant conditions and warm weather may effect too rapid volatilization with VM & P naphtha, impairing the working properties of the filler. Consequently, mineral spirits or dry cleaner's solvent with a slower evaporation rate is generally used in conjunction with VM & P naphtha. Lead-free white gasoline is also used to thin paste fillers. However, it is generally not preferred because of its toxicity, the fire hazard and the variance in the product obtainable. Kerosene is employed to a limited extent but is not recommended because of the non-drying fractions that are often present in commercial grades. Raw linseed oil aids the working properties of the filler but retards drying, promotes swelling and lifting of the sealer and may cause the sealer to turn gray.

Normally a washcoat is recommended prior to the filler application. The washcoat prevents filler bleeding to the stain or to the bleached or natural

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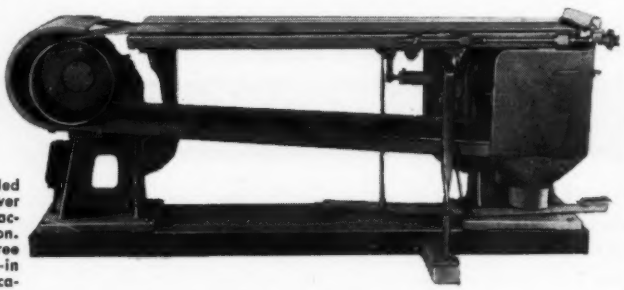

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under-surface. The washcoat or sealer, as it well might be called, is generally shellac cut one-half pound to the gallon.

The synthetic-type fillers now finding wide usage show considerably more variation in application properties than the old linseed oil-base-type filler because of the many possible formulations. In addition to the VM & P naphtha and mineral spirits, xylol and denatured alcohol are also employed as thinners. Because the synthetic fillers are normally formulated for a fast drying time, the thinning application technique and padding operations become more critical than they were with the old type filler. Since many of these filler formulations are adjusted for a particular operation, it is imperative that the finisher precisely follow the instructions of the formulator in order to effect quality filling and minimize problem possibilities. As the drying time is decreased, the temperature and humidity conditions in the plant should be controlled more precisely or production control cannot be adequately maintained.

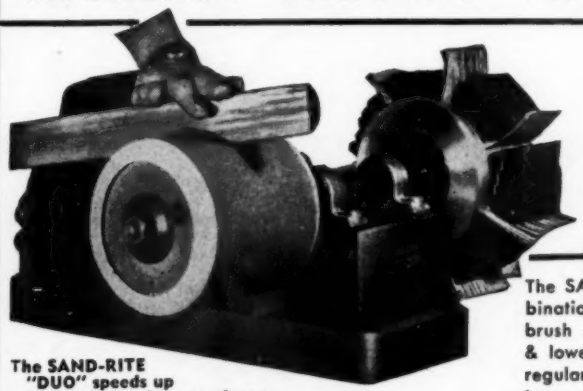
Problems.

Regardless of the exact filler use, the quality of the filling job is dependent on the skill and care of the finisher. Most filler trouble can be traced to a faulty application rather than to malfunctioning of the material.

Some of the troubles frequently encountered in filler application follow:

1. Graying of Pores. Fillers are composed largely of silicates with only enough coloring matter to produce the desired shade. The silicates have a high degree of opacity and tinting strength in the dry state, but are weak and trans-

INCREASE SANDING PRODUCTION



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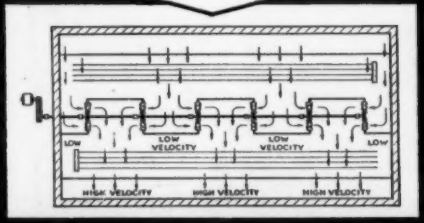
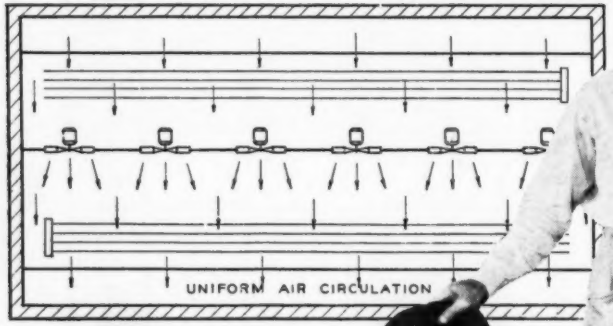
STANDARD Switched from this Out-of-Date Kiln Design in 1937



COSTLY OLD-FASHIONED KILN with line-shaft driven fans placed, *opposed in pairs*, at right angles to the direction of air flow proved to be an outmoded method of driving and an inefficient method of circulating air. It caused *indirect* cross circulation which resulted in greater horsepower consumption due to line-shaft drag, deflecting baffles, and fans blowing into each other. Using this design, baffles or ducts were required to deflect the air 90° which resulted in considerable *increases* in power consumption and *decreases* in fan delivery.

Because When Kiln Fans Fight Each Other—

HERE ARE THE FACTS!



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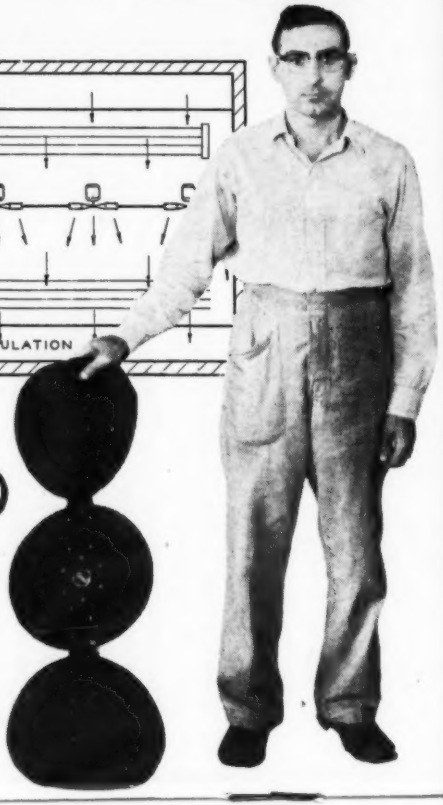
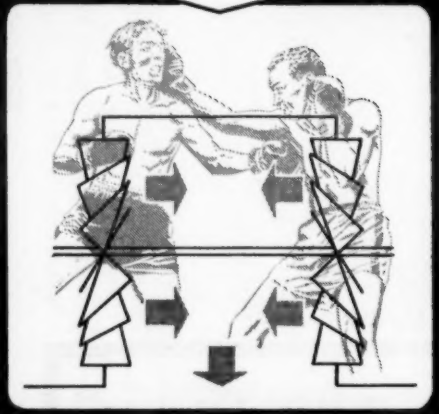


OFFICIAL CERTIFIED TESTS made in accordance with the code of the National Association of Fan Manufacturers, and the American Society of Heating & Venti-

Because When Kiln Fans Fight Each Other— You're the Loser!



OPPOSED IN PAIRS, kiln fans blow into each other—losing you money in increased power and maintenance costs, less uniform air circulation. That's why the modern Standard Dry Kiln with direct uniform cross re-circulation (without end drift) is so efficient and economical. It has direct ball-bearing driven fans which are *properly* placed, facing the direction of air flow through the lumber. Result: Low-cost operation, more uniform air circulation!

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parent when wet. Color pigments such as umbers, siennas and Van Dykes develop a strong color when wet and are relatively ineffective in the dry state. If the filler is low in binder, it is possible that there is only sufficient oil present to satisfy the oil absorption requirements of the pigment. If this is so, the oil and some of the pigment may be attracted to the wood substrate and the filler will acquire a gray coat. The graying is also caused by inadequate filler drying with an oil bloom giving the graying effect. Proper washcoating will reduce or eliminate graying in the former case.

Graying of pores has been found to be much more prevalent in mahogany than in other open-grained woods, although no qualified reason has been found.

2. Bleeding. Bleeding occurs where the oils or colors bleach into the sealer or into the wood substrate. This condition is caused by soluble coloring matter in the filler accompanied by inadequate drying and oils or varnish solvents in the formulation.

3. Poor Adhesion of Topcoats. Poor adhesion of topcoats may result from applying the sealer before the filler is thoroughly dried.

4. Popping. Lacquer sealer solvents may dissolve undried filler oils, thereby increasing the filler volume and creating a washboard effect. When the solvents are lost, shrinkage occurs in the pores creating a reverse washboard effect in the final finish.

5. Pinholing. Pinholing is the appearance of small holes over the pores through the entire finish, caused by escaping solvent vapors. This condition, however, may be caused by ex-

cessive pressure in spraying filler, and using too heavy a filler which allows solvents to volatilize in the base of the pores. Pinholing may be affected by improper solvent formulation. An excess of japan drier will cause rapid surface drying, leaving a solvent reservoir later to volatilize.

Pinholing also may be caused by the presence of water or oil in the air lines. Since they are incompatible with the finishing materials, globules may form in the finish coat and will subsequently release themselves or be opened by a sanding operation.

6. Shrinkage. Shrinkage is a common filler defect generally resulting from excessive thinning prior to application, or if the filler solids are too high in liquid binder and too low in pigment content.

7. Puffing. Puffing occurs when topcoats are applied over a filler that is too high in vehicle solids or one that is not thoroughly dry.

8. Fading. Often oil-soluble dyes are employed in filler formulation which have poor light stability.

9. Haze. An excess of linseed oil will cause excessively slow drying which tends to pull the filler out of the pores and cause a smeary finish. If the color of a filler is close to or lighter than the wood, a hazy appearance may result in the final finish.

10. Poor Wiping. Excessive japan drier may cause top drying which will affect the wiping quality of the filler.

The next article in this series will be on sealers.

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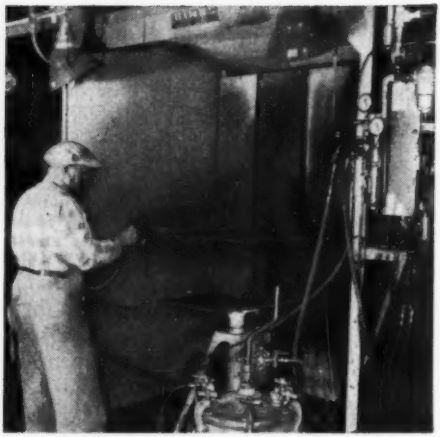

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SPRAYING Finishes By Steam

By
H. H. Connelly

CAN you imagine spraying lacquer, varnish or enamel without compressed air? It's being done! Spraying by steam was first introduced in June 1950 by the duPont Company after several years of research.

Since the invention of the spray gun, compressed air was the atomizing medium. It is good, too, for several obvious reasons. Air is free. But it becomes expensive when compressed for use in the spray gun. It is expensive because we must first make steam, then use the steam to turn a machine to compress the air.

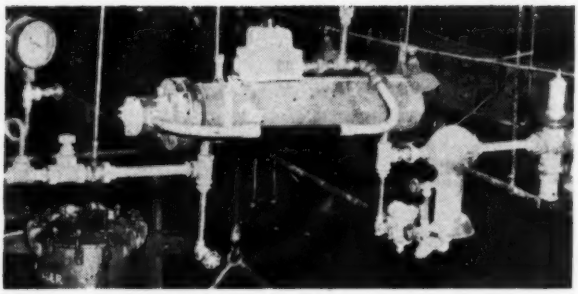
The obvious question then: Why not use the steam direct? Quite naturally several changes had to be made in the gun, the hose, the material, methods of controlling and using steam before it was proved practical. For one, the high temperature found necessary to successfully spray with steam called for a special rubber hose that would be safe to the workmen. A spray gun had to be developed to provide good insulation from the excessive heat. For another, the material being sprayed had to be altered—in lacquer especially.

What are the advantages of steam spray over compressed air? The biggest advantage is first—a saving of material. The actual savings will vary, depending upon the size of the object being sprayed; however, a modest saving of 10% to 20% is not unusual. Some concerns report a greater saving.

Second, steam spray allows the operator to place more material per pass than conventional spraying. A film thickness of four mils in one pass is not unusual with lacquer. Third, as a result of this reduction of overspray, a cleaner spray booth naturally follows. Consequently the demand for your water wash compound is reduced, fewer wall scrapings, fewer flue cleanings are necessary. All these spell reduced operation costs. The fourth advantage of steam spray is quite obvious—steam is cheaper to produce than compressed air. Fifth, your labor bill falls with each saving listed.

The sixth and final saving to be realized by steam spray is found in the formulation of the finish—to spray with air there is a point to which the solids must be reduced with thinner to atom-

This article will cause some disagreement, possibly, among our readers. However, some firms are successfully using steam spraying. If your firm is one of them, please share your experience with us.



Electric steam superheater used in steam spraying. The unit is thermostatically controlled and raises steam to a safe temperature above wet steam to prevent moisture from forming in the line. Pressure regulator is on the extreme right.

ize satisfactorily. Steam spray will atomize a material of higher solids than compressed air—you save in the cost of the thinner.

A West Coast manufacturer of store fixtures—the Weber Showcase and Fixture Company—converted to steam spray in 1951 and has been highly pleased with the savings realized. In this case, however, they were spraying enamel on metal fixtures. Since that time, however, the method has been extended to spray lacquer as well as paint and varnish satisfactorily.

How Steam Spray Saves Material

Material losses through spraying are classed under two categories where the medium for atomizing is compressed air. 1) Overspray losses which occur when the spray fan is projected beyond the edges of the work. Quite naturally it follows that the spray losses grow less as the work grows larger. A prime example is the comparative loss suffered when spraying a chest of drawers and a coat rack. 2) The second category is the atomization losses in the form of paint or varnish particles which are diverted from the work by the rebounding air steam—like a ping pong ball bouncing off the paddle. The losses from this source are usually greater than the first mentioned category. If this doesn't seem logical, cut your spray pressure from 60 pounds per square inch to 40 and note the saving in material. For this reason it is always recommended to spray with the lowest possible air pressure and still break up the finishing material into a finely atomized stream.

It is interesting to note that in spraying with air, the ratio of air to lacquer is a very important factor in controlling the loss of the solvents in the spray operation. After all, what we are trying to get on a piece of furniture is the solid—the solvent merely serves as a dilutant to make the solids sprayable. The amount of material lost in spraying, therefore, depends upon how much solvent we lose.

How does steam correct such losses? First by reducing the spread of the pattern. The steam for spraying enamel is super-heated. When leaving the boiler it is from 400° to 450°F. By the time it reaches the gun, the temperature has been dropped to 310° to 330°F. and 70 pounds of pressure per square inch.

The sudden expansion of the steam at the gun, at this high temperature, has the same effect upon the surrounding air as ammonia when passing through an expansion valve in a refrigerating unit—it cools rapidly. When cooling (you can safely hold your hand

in the steam eight inches from the nozzle) takes place, shrinkage or contraction results. The finely dispensed solids in the solvent are carried along by the steam and suddenly shrunken at the change in pressure. Consequently, the spray pattern knits together instead of spreading.

An Increased Film Thickness With Steam Spray

Convincing tests on steam spraying lacquer have shown that as much as four to four and one-half mils of dry film thickness can be placed on a vertical panel without sagging.

The savings in labor to obtain this thickness are quite apparent when it is recalled that only one to two mils of lacquer can be applied to a vertical plane with 27% solids lacquer using compressed air as a means of atomizing the material.

Steam spray, therefore, offers manufacturers a means of applying finishing materials in heavier coats than is possible through conventional means; and is a process that opens up tremendous possibilities for industry in the reduction of finishing costs.

What is the effect of heat on paint that leads to this heavy film thickness? A glimpse at the viscosity-temperature chart is the best explanation.

Despite greatly different initial viscosities (the viscosity depending upon the varying amounts of solvent) you will note the various paints all blend into one viscosity at temperatures above 160°F. For instance, the paint with the highest viscosity, 68° to 70°F. drops to a viscosity just above 15° to 160°F. Likewise the lowest point on the scale (viscosity of 25) at 70°F. reaches the same viscosity at 160°F.

In spraying with steam as the atomizing agent, the material is heated to a temperature of approximately 165°F. at the gun tip where the steam mixes with and atomizes the material. For this reason it is possible to spray material with but a fraction of the normal amount of solvent or thinner.

In short, we leave out the thinner or solvent and let the steam provide the correct flow.

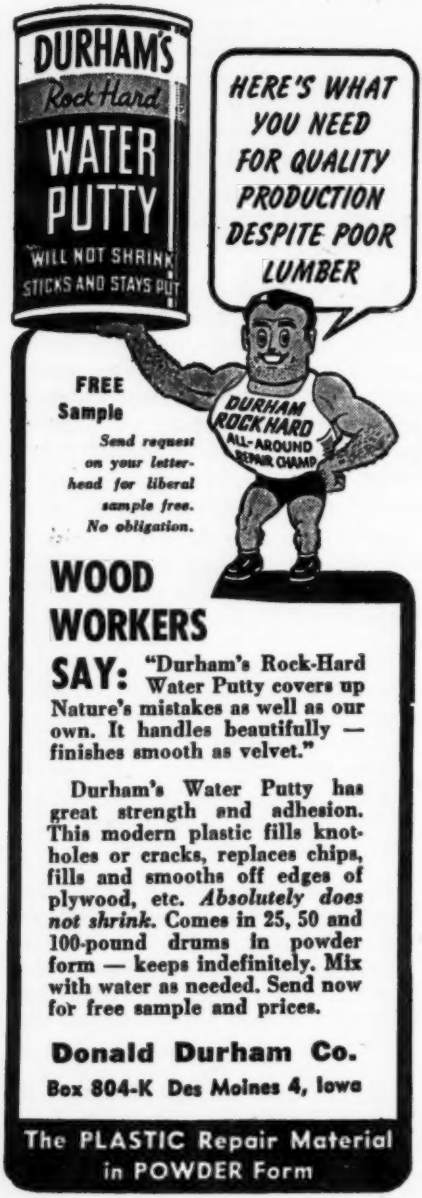
When we speak of steam substituting for solvents and thinners, in paints, lacquers, and enamels, it must be understood that this is practical only insofar as the liquid must be viscous enough to be forced to the spray gun by compressed air through the pressure feed tanks.

For all practical purposes, however, what solvents do in the case of finishing materials is to reduce temporarily the viscosity—the resistance to flow—of the substance they dissolve.

Solvents are expensive. In many finishing materials the solvents are more costly than the solids left on the work as a protective coating. Therefore, any process that tends toward the elimination of these solvents and thinners lowers the initial material cost and is worth serious consideration.

In formulating lacquer, for instance, manufacturers have a choice of not one solvent but dozens. These solvents are classified under (1) low boilers—below 100°C., (2) medium boilers—near 125°C., (3) high boilers—above 150° C. All are more or less expensive.

So, in steam spraying lacquers, the heat does two things to aid a heavy film build. First it makes the lacquer more viscous at the gun tip resulting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Second, the heat aids in the rapid dissipation of the contained low boiling solvents. The net result is that the solvents are separated from the solids and a large percentage disappear like a wraith into thin air before they ever reach the work.

The material that is left and reaches the work is thus of a higher solid content.

Consequently the flow, the chances of sagging, and even drying time is considerably reduced. Logically enough then, we find that we end up with a film thickness several times that of air spraying; resulting in one pass with a spray gun often doing the work of two.

Saving Labor

Most finishing materials used in industry today are applied by spray methods. Most equipment in the furniture finishing plant requires the use of hand labor to manipulate the guns. It requires the use of extensive conveyors or pallets for moving the furniture parts to and from the spray booth.

Any improvement in either process or material that will allow the operator to do in two applications what he formerly did in three will reduce the spraying time 50%. If he can do in one pass what he formerly did in two, his reduction is 100% of the older method.

This is a considerable saving from the operation alone. There are other labor savings to be realized. For one we should consider the labor necessary to move the material to the spray booth;

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The B&D 88 Heavy-Duty, Orbital Sander is the fastest, most powerful sander on the market! For information, write: THE BLACK & DECKER MFG. CO., Dept. 2710, Towson 4, Md.

PORTABLE ELECTRIC TOOLS

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New Efficiency

The sensational new FLEX-A-PRENE Paint Mask keeps out paint pigments and solvents with amazing efficiency, yet it's light (just 1 ounce), comfortable and so easy to talk and breathe through you hardly know you're wearing it.

New Economy

FLEX-A-PRENE's low first cost is only part of the story. Most important savings come from its endurance in service and time saved through less frequent filter replacements. You can expect at least 100 hours of exposure before replacement is necessary.

Sample: $1.50 postpaid
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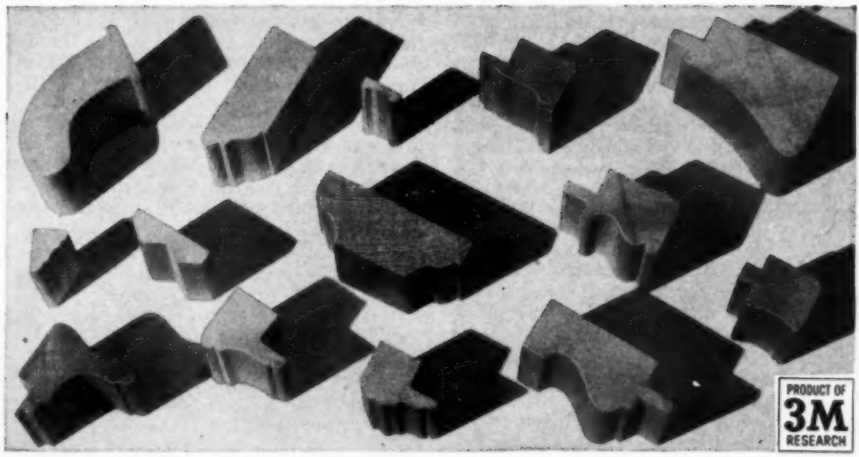
FLEXO PRODUCTS, INC. Cleveland 13, Ohio

and we should add to this the savings found in eliminating the time necessary to remove the sprayed part.

If this is mechanical—by conveyor—we can often eliminate an extra booth, the extra drying time, and the equipment necessary to dry a second or third spray cost.

One factor of labor that should not be overlooked is that necessary to clean out the spray booths, replenish the waterwash compound, empty the sludge, etc., that occurs as a result of excessive overspray. Other labor savings that may result from the use of steam spray are found in the indirect labor so necessary to keep a finishing room going—the men who fill the pressure feed tanks, the men who mix material, etc.



Longer-lasting 3M Garnet Cloth Belts sand any moulding shape better, faster!

Note the intricate contours of these mouldings, the sharp "knife" edges and valleys. Sanding shapes like these is a tricky job—done perfectly with 3M Garnet Cloth Jean belts.

3M Garnet Cloth belts are faster-cutting than ordinary mould sanding belts, and longer lasting. Reason for this is superior grain anchorage, making them resistant to mineral peeling, the commonest problem in mould sanding.

And 3M Garnet Cloth belts are more conformable—they flow smoothly over a "knife," retain their shape far longer than ordinary belts. Perfect for fixed, hand or automatic sanding, they require only light pressure because of their extra sharpness. The *belt* does the work.

Yes, for any mould sanding job, you'll be money ahead with 3M Garnet Cloth Jean belts—longer-lasting, faster-cutting, more conformable than any other moulding sander belt on th market today. Be sure to specify 3M every time you order. For further information send for booklet "3M System of Furniture Finishing," using coupon below.

The final finish mirrors all previous operations

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1905 PLYWOOD 1955 GOLDEN JUBILEE

Made in U.S.A. by Minnesota Mining and Mfg. Co. General Offices: St. Paul 6, Minn. In Canada: London, Ont., Can. Export: 122 E. 42nd St., New York City. Makers of "Scotch" Brand Pressure-Sensitive Tapes, "Scotch" Brand Magnetic Tape, "3M" Adhesives, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing.

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"BEAUTYGUARD" SURFACES

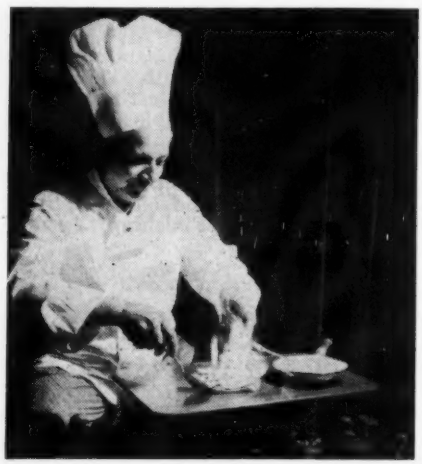
Crepes suzette flaming on a genuine walnut table demonstrated the extreme burn-resistance of the new "Beautyguard" genuine hardwood surfaces developed by the Fine Hardwoods Association and shown to manufacturers for the first time at the recent N.A.F.M. convention and Fair at the Conrad Hilton in Chicago.

The crepes suzette, blazing in their alcohol, sugar, butter and fruit juice sauce, did no damage to the real wood surfaces protected by the new "Beautyguard" process which is a combination of foil-laminated plywood and lab-approved surface finishes in any finish effect. Joseph Moran, a Hilton chef, prepared the flaming crepes suzette.

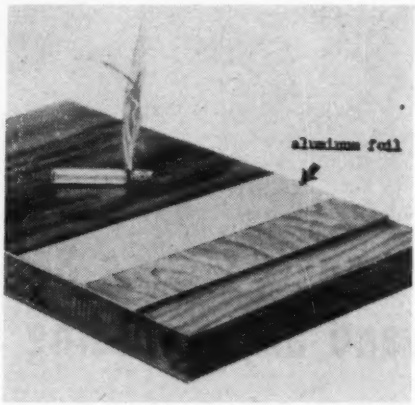
A cigarette can burn completely to ash without damaging these new genuine wood surfaces, which are also unharmed by nail polish, 190-proof alcohol, fruit juices and acids.

Manufacturers will introduce home furnishings—cocktail and dining tables, bars, dressers, etc.—with the new "Beautyguard" surfaces at the January furniture markets. The new construction and finishes are also being introduced in the institutional and office furniture fields.

The Universal Equipment Company division of Romweber Industries has been working experimentally with the association during the research development, assisting on in-plant tests and test installations of actual school furniture using the "Beautyguard" process, and is now offering the Universal institutional furniture line with "Beautyguard" genuine hardwood surfaces.



Chef demonstrates the extreme burn-resistance of the new "Beautyguard" genuine hardwood surfaces.



New super-resistant surfaces are made possible by laminating an aluminum foil layer beneath the surface in hardwood plywood, and finishing the genuine wood surface with approved finishes.

The Fine Hardwoods Association, which developed the process for the benefit of the entire furniture and woodworking industries, is making the process available free to all manufacturers agreeing to use approved materials.

The new process can be used with all hardwoods and is easily laid up in any plant equipped to make plywood. Panel producers will supply the panels finished or unfinished to those manufacturers not wishing to lay up their own "Beautyguard" plywood panels.

You step up your production with Supreme Knives... milled to exact specifications... to insure a perfect fit in the machine. Made from the correct alloy steel for your particular job, Supreme Knives work harder... longer. The expense of early re-sharpening and replacing is eliminated. We design and make Special Knives to your requirements.

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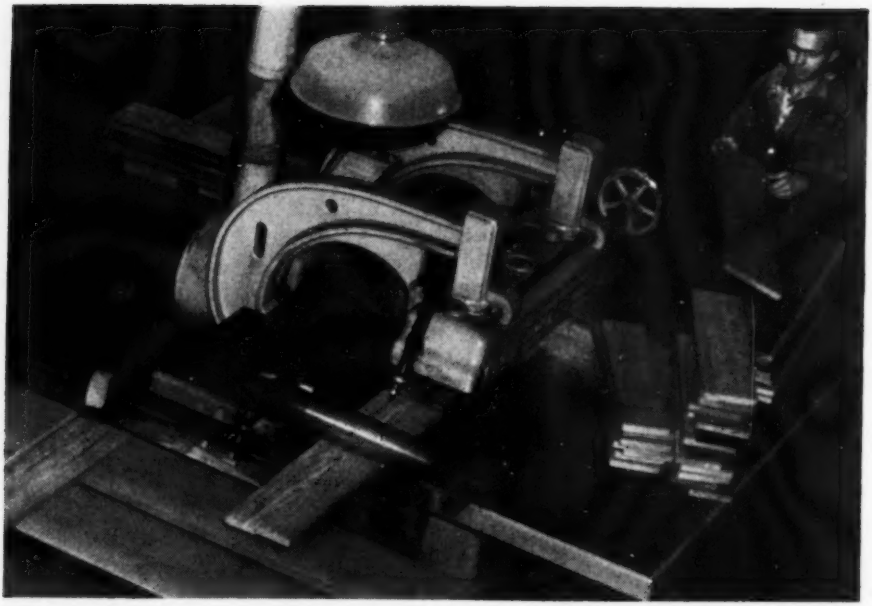

Glue joints direct from the saw at Pacific Lumber Company

Pacific Lumber Company of Scotia, California, is getting more complete utilization of materials by edge gluing redwood stock that flows through their mill. Their production is hitting an average of 12,000 board feet in an eight hour shift. Panels are produced in a variety of widths, and lengths from 5½ to 8 feet.

Pacific Lumber has found that the Diehl #750 is unsurpassed for high-speed, *tough* sawing and for precision accuracy in cutting straight and hollow glue-joints. It offers speeds up to 250 fpm and handles stock from ⅛" to 4½" thick.

Ask for a demonstration of the extra production—and profits—that can be yours with Diehl #750 Rip Saws.

THE G. M. DIEHL MACHINE WORKS, INC.
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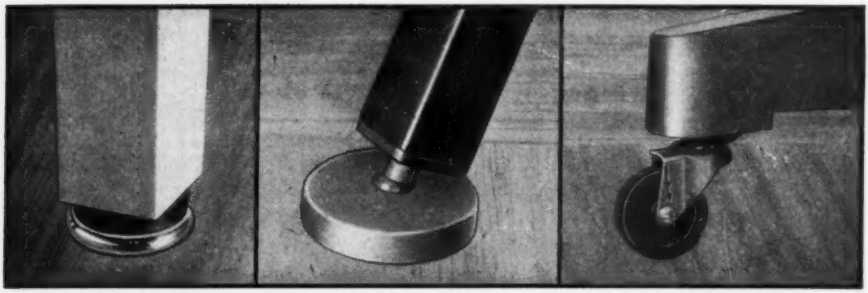
Perfect fit for any foot



Rubber-Cushion Glide | Full-Tilting Glide | "Diamond-Arrow" Caster

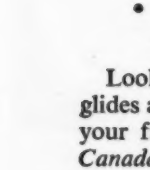
Bassick glides and casters

Heavy or light, metal or wood furniture — there are Bassick glides and casters to fit them all!

And most important — they are designed to protect fine floors and floor coverings.

- **Rubber-Cushion Glides** slide silently on hardened steel bases that can't gouge.
- **Full-Tilting Glides** distribute the weight of modern spider legs over a wide area of contact.
- **"Diamond-Arrow" Casters** roll at a touch and swivel easily . . . make all types of furniture easy to move.

Look at your product again. Chances are Bassick casters and glides are the low-cost sales feature needed to put a "sold" ticket on your furniture. THE BASSICK COMPANY, Bridgeport 2, Conn. *In Canada:* Belleville, Ont.



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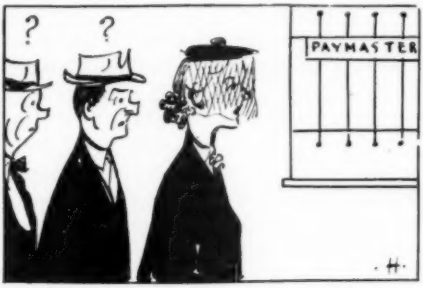
MAKING MORE KINDS OF CASTERS . . . MAKING CASTERS DO MORE

ADVERTISED IN The Saturday Evening POST

Right or Wrong?

A roundup of day to day in-plant problems and how they were handled by management men. Each incident is taken from a true-life grievance which went to arbitration. Names of some principals involved have been changed for obvious reasons. Readers who want the source of any of these cases may write to WOOD WORKING DIGEST.



If an employee dies is his widow entitled to his vacation pay?

What Happened

The company had a policy which paid 4% of earnings as vacation pay provided the employee worked from the "last of May of one year to the last of May of the next." However, to collect the vacation money, the worker had to have seniority as of July 1st. On June 2nd of last year, John Brudzinski had a heart attack and died. His widow put in for her deceased husband's vacation money. The company, not wanting to set any precedents, refused on the grounds that John was not on the payroll as of July 1st. His widow pooh-poohed this defense. She claimed that her husband was on the payroll for a year from May to May, and the July 1st stipulation was only for the company's convenience, so it would have time to compute the vacation eligibility. Besides, she contended, her husband's not being on the job on July 1st was not due to any fault of his, and technically he still had seniority because he didn't quit and he wasn't fired.

Was the widow: Right ☐ Wrong ☐

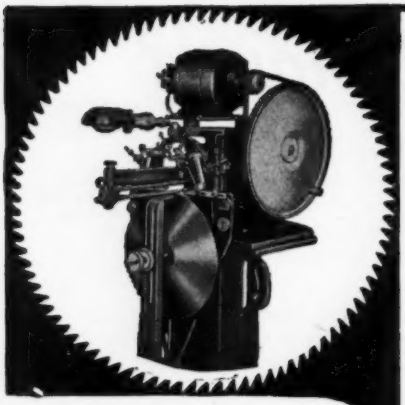
What Arbitrator Murray D. Welch Ruled

"A person cannot have seniority after his death. It is a personal right and cannot be inherited by others. Grievance denied."

Can you discharge a worker who used "Dirty Language" to his supervisor?

What Happened

Sal Maliterno had a fight with his wife before he came to work. He was feeling pretty sore at the world. When his foreman came over and told him to do a job he didn't like, he really let go. He unloosed a stream of language right out of the gutter and refused to do the assignment. He was fired.



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The Foley is the ONLY machine that files crosscut circular saws, band saws, hand saws.

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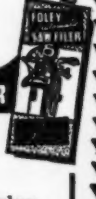

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Please send literature on the Foley Automatic Saw Filer and details of your 30-day Trial.

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Address.....

Was the employer: Right ☐
Wrong ☐

What Arbitrator B. Meredith Reid Ruled

"It is the position of your arbitrator that the use of obscene language by employees during working hours and on the company premises is wholly inexcusable and bad for employee morale and good labor relations and working conditions. Your arbitrator also finds that a refusal to carry out assigned work herein is a definite violation of contract terms. Many companies have rules against the use of obscene language on company premises, and your arbitrator would recommend that such a rule be established by this company. In view of all the existing facts, however, it is the considered opinion of the arbitrator that although there was ample and just cause for discipline of Sal Moliterno, discharge was too severe a penalty and not merited. Accordingly it is ordered that Moliterno be reinstated without back pay."

Can a foreman who is doing a poor job himself fire an employee for "inadequate output?"

What Happened

Louis Manet was a friendly foreman indeed. He was a "regular guy," joking with the employees, letting them talk all they wanted to at their jobs, and he never seemed to take things too

seriously. In fact, occasionally, he would indulge in a bit of harmless horseplay just to show the gang that he was "one of the boys." Leone Meverden was an employee in his department, having recently been transferred from another unit. Her quality of work was okay, but she was very slow. In fact, some of the other girls had to help her out every once in a while, and she was given additional instruction in order to get her to meet the standard. Manet, her foreman, after putting up with this low output, gave her a warning slip. Then he talked to her, and when she didn't improve, he fired her. She filed a grievance, and her complaint was:

1. Her supervisor didn't give her enough instruction.
2. Everybody in the department "goofed off" because the supervisor let people do as they pleased. So why should she be singled out for discharge?

The company showed records of her low productivity and proved that her output was far below that of the others in the department.

Was Leone: Right ☐ Wrong ☐

What Arbitrator Clarence M. Updegraff Ruled

"It appears to be established that there were some elements of wrongdoing on both sides. Miss Meverden was not respectful of representatives of management and knowingly failed to do her assigned tasks with proper promptness. Human nature being what it is, a reasonable amount of talking and jocularity must be expected and perhaps even condoned in all establishments where people are assembled. Management cannot expect to have a satisfied working force if it attempts to make human beings act like machines.

Precision Balanced DETROIT KNIVES For Every WOOD-WORKING JOB — OUR OWN SPECIAL ALLOY STEEL KEEPS EDGES LONGER.

Order Today!

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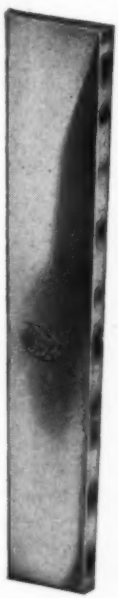
VENEER-CLIPPER
SHAPER STEEL



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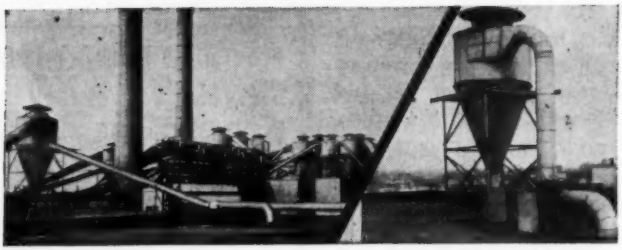

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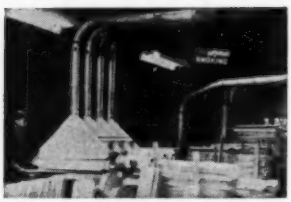

OBP systems feature low initial cost, are virtually maintenance-free, and give years of efficient service. These systems are installed without disturbing your production layout and without causing any down-time. Initial cost is surprisingly low, and maintenance is negligible. You get a clean plant, clean air, reduced fire hazard, increased working space, elimination of boxes, trucks, litter, dirt and confusion necessary with manual clean-up, as well as more desirable working conditions, greater production, and possible increased profits. Call an OBP engineer today.

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"On the other hand, it must exercise care and judgment to see that various elements of conduct unrelated to work are kept reasonably within bounds of efficiency and propriety. To this end, supervisory officers must completely and entirely exclude themselves from all horseplay and practical jokes. Their participation in these things invited playful retaliation by the other employees. One extreme leads to another. In such an atmosphere, efficiency disappears and losses of one sort or another become inevitable. Miss Meverden shall be deemed to have been properly discharged, but under the circumstances, she shall be entitled to $400.00 in severance pay."

Those who need advice the most, like it the least.

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Southern **SCREW COMPANY**

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NEW LITERATURE

LENOX BAND SAW BLADES

The American Saw & Mfg. Co., Springfield, Mass., has issued literature about the Lenox hook-tooth band saw blades which have "deep planing" action. The blades are usable on either hard or soft wood. Hook-tooth blades hook themselves into the work, cutting full helical chips.

The literature illustrates the blades and includes a table of hook-tooth standard sizes.

METAL DETECTOR

Allis Chalmers electronic metal detectors are now being used to inspect wood. The detector is an electronic inspection tool designed to reveal tramp

Cut a *Faster Pace*
Hit a Smoother Rhythm
. . . with
"STEP CUTTERS"

ECONOMICAL
EFFICIENT
VERSATILE

These new Onsrud tools solve many touchy Production Problems. Recommended for wood, plastics and non-ferrous metals. High grade carbon steel body with carbide tips. May be resharpened or retipped at nominal cost. Cutters are staggered on the spindle, forming "steps" which give intermittent cuts, allowing faster feeds, smooth finish, reduced spindle strain. Cutters may be stacked any desired height . . . may be ground with side clearance for slotting, grooving or other operations.

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"Better Tools for Industry"

Cutter Manufacturing Co.

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metal in non-metallic products. It consists of two box-like compartments separated by spacer blocks. Products or materials passing through this opening are continuously screened by a high frequency magnetic field. The presence of stray metal causes an electronic disturbance. This triggers a device which may operate in a variety of ways.

The metal detector bulletin is available from the Allis-Chalmers Mfg. Co., Box 515, Milwaukee 1, Wis.

S-D DAY

December 1, 1955, has been set aside by the National Safety Council as S-D Day. The council is asking all industry to join in the S-D Day effort, thus serving a vital safety cause, furthering company safety programs and building goodwill for individual firms. A folder telling of the effort is available.

Write the National Safety Council, Service Extension, 425 N. Michigan Ave., Chicago, Ill., for a copy of the S-D folder.

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DUST COLLECTORS

SAVES INSTALLATION TIME

Stop dust quickly, at lower cost, with Dustkop. Thirty-seven standard models *ready to use* and available from stock. Dustkop conserves floor space, reduces maintenance. Collects almost all types of industrial dusts. Write for descriptive literature.

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AGET MANUFACTURING COMPANY
1382 East Church St. • Adrian, Michigan

GRANITE BOARD

A newly published folder, describes a remarkable new core material for plastic laminates and plywoods. This core material is said to possess maximum strength equally in all directions as well as being dimensionally stable, and to have bonding facility, bonding strength, and workability in every direction on any plane.

The folder describes "Granite Board" as improved over earlier cores in nail and screw holding ability, holding nails and screws close to the edge without splitting. The folder and information regarding available sizes and economies is available from Aetna Plywood & Veneer Company, 1737 N. Elston Ave., Chicago 22, Illinois.

PRICE & RUTZEBECK CATALOG

Price & Rutzebeck incorporates its complete line of hand machine tools

in a new 12-page catalog, No. MC-802, sized and punched for permanent filing. Covers its complete lines of "Planetor" boring and machine bits, wide range of O.C.E. carbide-tipped tools, "Grips Rite" angle head, handy angle saw, and for the first time, illustrations and details of chrome-impregnated "Tuff-Tooth" saw blades.

Request Catalog MC-802 from Price & Rutzebeck, Post Office Box 30, Hayward, California.

PLANE BOOKLET

"How To Use the Porter-Cable Router-Shaper-Power Plane" is the title of a new 48-page manual. The manual describes the trio of tools which uses a single interchangeable electric motor to power any one of the machines, thereby saving the cost of two extra motors.

Furniture manufacturers, industrial woodworkers, pattern makers and exhibit builders will discover many con-

HELP WANTED: Carbide Tipped Saw Blade to work three shifts in Production Shop. **MUST BE EXPERIENCED.**

A. W. FORREST MFG. CO., Inc.

If you are interested (and you probably are), in a Carbide Tipped Saw Blade with **"experience"**, consider what you really mean. In all probability what you are looking for is a blade that can be installed on YOUR particular machine . . . a blade that will do the job YOU want it to do, **"Without Compromise"**.

Forrest Blades are backed by years of **DESIGN EXPERIENCE** . . . years of manufacturing and designing **custom blades** for special applications and installations.

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BROCHURE AND JOB SPECIFICATION ANALYSIS FORM

Firm _____

Att. of _____

Street _____

City _____ *State* _____

Type of machine _____

Material to Cut _____ *thickness* _____

Required Dia. _____

Used for: Ripping ☐ *Crosscut* ☐ *Mitering* ☐

Other _____

FORREST BLADES — OFTEN COPIED BUT NEVER DUPLICATED.

venient uses for these handy, low-cost tools.

WOOD HANDBOOK

An enlarged and completely revised edition of the U. S. Department of Agriculture's Wood Handbook, the "bible" of the woodworking and construction industries, has been issued by the U. S. Forest Products Laboratory.

The up-to-date handbook contains more than twice the number of pages of the original volume. Within its 528 pages is information on subjects that the 1935 version never even mentioned.

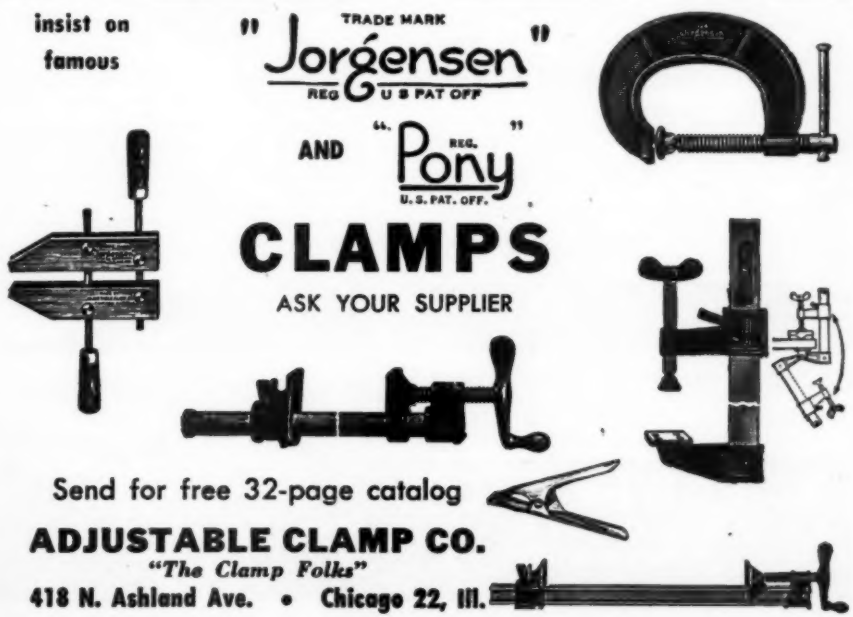
A new section on structural sandwich construction includes information on the fabrication and design of sandwich panels, as well as the results of extensive research on the insulation properties, fire resistance, and durability of sandwich construction.

A new section on plywood and other crossbanded products has been revised and enlarged. It features the results of much research on the strength and physical properties of plywood. The completely revised section on glued wood lamination contains the most recent information on the characteristics, design, and strength of laminated members.

Two completely new sections conclude the revamped volume. The section on building fiberboards covers various types of insulation board and structural hardboard. The section on modified woods and paper base laminates includes most of the available information on these new products of wood research.

The revised, 1955 edition of the "Wood Handbook" can be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D.C., for $2.00 per copy, cash or money order.

There aren't any hard-and-fast rules for getting ahead in the world—just hard ones.



SPEED with the POWER PLANER

No. 380
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PLANER

FLEXIBLE CONTROL

OF SPEED is only one of the many features that places the POWER Planer far and ahead the most desired planer in the industry. For a very good reason experienced woodworkers prefer POWER Planers for the more particular and exacting jobs. For eighty six years, thousands of Planers have been produced of all types: roll feed, endless bed feeds, single, double and four side machines, dimension planers, deck planers etc. There is no substitute for experience in the development of precision Planers. Write today for full information on this latest Model POWER Planer.

HIGHEST QUALITY SINCE 1867

Planers - Tenoners - Planers & Matchers
Resaws - Band Saws - Power Feed Rip Saws

L. POWER & CO.
2823 Oakford St.
Philadelphia, Pa.
Manufacturers of POWER Machinery Since 1867

NEW PERKINS PLANT

Perkins Glue Company, home offices at Lansdale, Pa., is opening a new plant at Shawano, Wis. Scheduled to begin operation this fall, the new plant has a production capacity of almost two million pounds of resin glue per month plus the catalysts required for use of the resin in woodworking. Perkins district manager, E. M. Jones, is in charge of the manufacturing operation.

HOE ADDS DIVISION

J. L. Auer, president of R. Hoe & Co., Inc., announces Hoe's acquisition of the plant of the Carolina Saw and Tool Company, manufacturers of carbide tip saws, at High Point, North Carolina.

The new plant under the Hoe ownership will be the nucleus of a greatly expanded operation to include new building facilities, extensive new equipment and added personnel. It will be known as the Carbide Saw and Tool Division of the Hoe Company.

NORTH-CENTRAL FPRS MEETING TO FEATURE STANFORD REPORT

The Stanford Research Report to Weyerhaeuser Timber Co. on the 1955-75 outlook for forest products will be the big feature of a three-day North-Central regional meeting of the Forest Products Research Society to be held at the Blackstone Hotel, Chicago, November 15-17.

The big meeting, with the Midwest, Great Lakes and Upper Mississippi Valley sections of FPRS as joint sponsors, is expected to draw a heavy attendance from these areas as well as from the Ohio Valley and other sections, not only because of the importance of the Stanford Report and its implications, for all segments of the industry, but also because the sessions will be held concurrently with the Wood Industries Division meeting of the ASME Diamond Jubilee convention.

A reciprocal arrangement is being worked out to permit attendance at both the FPRS regional meeting and the ASME Wood Industry Division sessions. A program sidelight will be a visit to the Hardwoods Exhibit at the Museum of Science and Industry.

KITCHEN CABINET ASSOCIATION

The National Institute of Wood Kitchen Cabinets has set up headquarters in the Chicago Temple Bldg., 77 W. Washington Blvd., Chicago 2, Ill. Richard C. Chapman is president of the organization; Fred F. Montiegel, manager, John E. Harr, publicity director; Maurice E. Collins Organization will conduct the institute's administrative and promotional program.

The consumer education program is aimed toward familiarizing the public with the beauty and performance advantages of wood kitchen cabinets and to disseminate information which will be helpful to consumers in all phases of kitchen planning.

CONVENTIONS

October 11-13—National Hardwood Lumber Association, Chicago.

October 11-14—Materials Handling Clinic, Cleveland, Ohio.

October 13-14—Fall Meeting, Ohio Valley Section, F.P.R.S., Louisville, Ky.

October 17-21—National Safety Congress, Chicago.

October 20-21 — Architectural Woodwork Institute, Chicago.

Fall Meeting, Northeast Section, F.P.R.S., Prince George Hotel, New York City.

West Coast Meetings by National Wooden Pallet Manufacturers Association, Sheraton-Palace, San Francisco.

November 7-8—Fall Meeting, Mid-South Section, F.P.R.S., Peabody Hotel, Memphis, Tenn.

November 15-17—Fall Meeting, North-Central Section, Chicago.

A.S.M.E. Meeting, Wood Products Section, Chicago.

January 22-26—National Association of Home Builders, Chicago.

June 4-7—1956 Tenth National Meeting, F.P.R.S., Asheville, N.C.

BENTWOOD ACQUIRES CASTLEWOOD

Bentwood Products, Inc., Louisville, Kentucky, have taken over the manufacture of the more popular styles of the Castlewood brand of inlaid wood folding tables, including the well known patented push-button mechanism for easy folding of the tables. A feature of the Bentwood folding chairs is the concealed hinge mechanism which gives the appearance of a regular solid living room chair.

Castlewood Manufacturing Company was recently purchased by Cochran Foil Company, Louisville, Kentucky to give added room for their expanded foil manufacturing activities.

NUTTING REPRESENTATIVE

Nutting Truck and Caster Company, Faribault, Minnesota, announces the appointment of the A.C. Andrews Company, 2109 Main Street, Dallas 1, Texas, as its sales representative for the Dallas territory, which includes the northeast section of the state of Texas. The Andrews Company will handle the complete industrial and institutional line of Nutting floor trucks, wheels and casters, in addition to its other lines of materials handling equipment.

TIMESAVER PLANT EXPANSION

Construction is underway for additional factory and manufacturing facilities at the suburban Minneapolis, Minn., plant of Timesavers, Inc.

These facilities are needed to increase production of the Timesaver Shapesander and Speedsander machines.

Appointments

John Witherspoon has been named forester for American Forest Products Industries at Washington, D.C. He succeeds Ted Davis.

Penokee Veneer Company announces the election of **James E. Hershberger** to the office of a vice-president. He has been with the company for 16 years.

Dr. Paul W. Bachman, well-known for his outstanding research, has been elected vice-president and director of research and development for Koppers Co., Inc.

Snyder Chemical Corporation has announced the election of **William T. Hack** as president. Mr. Hack succeeds Ashworth N. Stull who will be devoting all of his time to American Resinous Chemicals Corp.

Minnesota Mining & Manufacturing Company has placed **Robert W. Adam** in the position of manufacturing manager of the tape division. **James E. Corbin** is the new technical director, retail trades tape division and **Gordon W. Engdahl** is technical director, fibrous and industrial tape division.

Harry A. Freiberg, Jr., has become president of the Freiberg Mahogany Co., Cincinnati, Ohio.

RUBBER PRODUCTS

Specifications and descriptions of 68 different rubber hose for every industrial use are presented in the new 8-page catalog digest announced by the Industrial Rubber Division of the Thermoid Company, Trenton, N.J. Several of the hose types described are new additions to the Thermoid line and have only recently been added.

In addition, the brochure contains data on 9 types of conveyor belts, 7 types of flat power transmission belting, multiple and fractional horsepower V-belts, chute lining, rubber sheet packing and industrial friction materials.

THE PLYWOOD AGE

"The Plywood Age," Robert M. Cour, published by Binfords & Mort, Portland, Oregon, $3.50.

There is a commendable appropriateness in the sponsorship of this book by the Douglas Fir Plywood Association, on its 50th anniversary. Another most fortunate circumstance is that, even after 50 years, many of the principal characters in this industrial drama are still with us, and could participate not only in supplying facts, but also have the satisfaction of receiving the commendation that is their just reward for faithful labor in the strenuous formative years of this enterprise.

Douglas fir plywood made its public debut at the Lewis & Clark World's Fair Exhibition, held in Portland, Oregon in 1905. Interestingly enough Tom Autzen, then a stripling youth, was the official demonstrator and salesman. His whole life has been devoted to the plywood industry, and he is still a stalwart plywood executive connected with the M & M Woodworking Company, operating one of their plywood mills.

For more than 20 years after this debut, the Douglas fir plywood industry struggled along without getting much of anywhere, and for another decade its progress was discouragingly slow. But about the mid-1930's an encouraging tonic was administered, that of a thoroughly waterproof phenolic resin glue, which was hardened in the primitive hot presses in a matter of minutes. This shortened production time and broadened the fields of plywood applications into weatherproof outdoor structures and watercraft.

The author is generous in his credit, and quite rightly so, to the many pioneers who struggled through the lean years, quite a number of whom lived to see their dreams more than fulfilled.

A dramatic incident is the five day and night struggle of seven plywood enthusiasts, who had virtually locked themselves into a hotel room at Pacific Beach. This group of plywood pioneers was firmly determined to develop an aggressive sales program, which would keep their plywood mills busy and growing. They were successful, far more than they anticipated. Shortly thereafter, in 1938, W. E. Difford was persuaded to become their leader and the Douglas Fir Plywood Association was born.

The author accords special credit to W. E. Difford, the Managing Director of the Douglas Fir Plywood Association, during most of the intervening years, for nursing the young infant into sturdy manhood. He is still its dynamic leader.

"Your age, please," asked the canvasser.

"Well, now let me figure it out. I was 18 when I married and my husband was 30, he is now 60, or twice as old as he was then, so I am now 36."

Successful Fair Held By N. A. F. M.

FURNITURE business will continue to be good the rest of 1955, but higher production costs leading to higher prices may slow the trend. This was the cautious note of optimism sounded at the 27th annual National Association of Furniture Manufacturers Convention held at Chicago's Conrad Hilton Hotel, August 28-31.

"Ninety per cent of 141 companies surveyed in August think business will be good the rest of 1955," reported John M. Snow, N.A.F.M. executive secretary. "Ten per cent think business will be fair."

The figures indicate a sharp increase in optimism since March, when only 60% of manufacturers expected good business, with 33% looking for fair business, and 3% expecting poor business.

Increased summer market sales, along with continuing good road and mail order business, indicate the good trend, Snow said. Seventy per cent of the manufacturers increased summer market sales, averaging 38% higher than 1954. Ten per cent had decreased, averaging 15% under 1954.

Fair or good road and mail order business for 94% has kept the ball rolling since the summer markets. Some 83% of manufacturers think dealer inventories are normal.

N.A.F.M. ELECTS OFFICERS

Kenneth Kroehler, vice-president of Kroehler Manufacturing Co., Naperville, Ill., was elected president. The manufacturers also elected the follow-

With a snip of the scissors, Clyne Crawford, president of Crawford Furniture Manufacturing Co., Jamestown, officially opened the Fair. Others in the group include (front row, left to right) John M. Snow, W. S. Marder, (back row, left to right) N. A. Eddy, T. K. Creal, and P. A. Tonk.

New officers. Standing: Clyne Crawford, Paul Brandt, N. A. Eddy, T. K. Creal. Seated: Percy A. Tonk, Kenneth Kroehler, John M. Snow.

ing officers to serve for a one year term.

First vice-president, N. A. Eddy, III, president, Habitant Shops, Inc., Bay City, Mich.; second vice-president, Thomas K. Creal, president, Paramount Furniture Co., Warren, Pa.; third vice-president, Paul Brandt, president, A. Brandt Co., Fort Worth, Texas; treasurer, Percy A. Tonk, chairman, Tonk Manufacturing Co., Chicago, Ill.; executive secretary, John M. Snow, Chicago, Ill.

N.A.F.M. directors elected for the first time to serve three years include:

Tinsley Rucker, Dixon Powdermaker Furniture, Jacksonville, Fla.; Ralph Taylor, Jamestown Cable Co., Jamestown, N.Y.; James Patterson, Imperial Furniture Co., Grand Rapids, Mich.; G. A. Snyder, Period Tables, Inc., Henderson, Ky.; and Mendall Selig, Selig Manufacturing Co., Leominster, Mass.

Directors re-elected to serve three years include:

Thomas K. Creal, Paramount Furniture Co., Warren, Pa.; J. M. Sampson, Phoenix Chair Co., Sheboygan, Wis., L. M. Schnadig, International Furniture, Chicago, Ill.; R. F. Schnaus, Jasper Novelty Furniture, Jasper, Ind.; and R. L. Swanson, Jamestown Lounge Co., Jamestown, N.Y.

Arthur W. Green, President, Kramer Corporation, Indianapolis, Ind., was elected to serve as director for one year, filling the uncompleted term of H. C. Perry, Heywood-Wakefield Co., Gardner, Mass., who died this year.

COST-CUTTING INTEREST

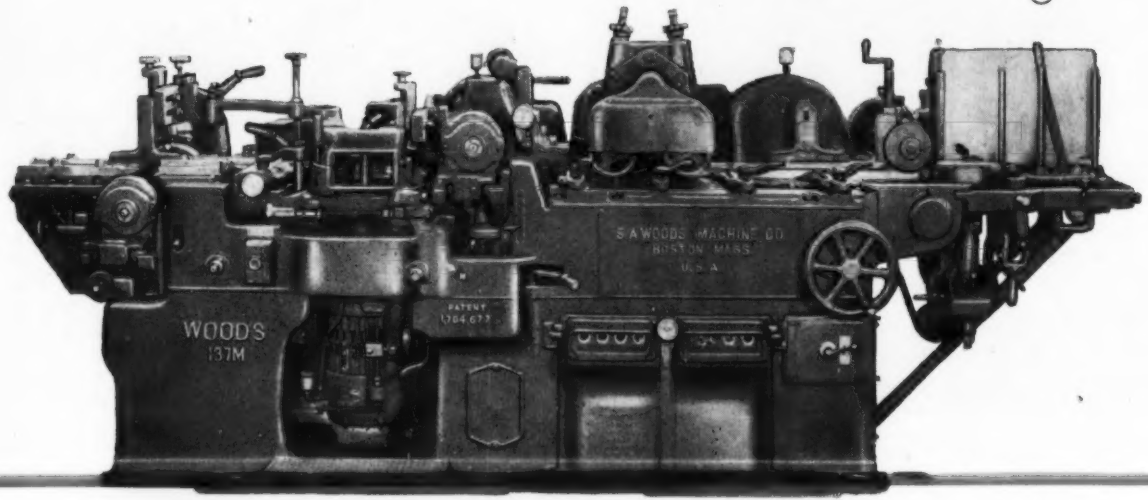
Intense interest in holding the cost line in the face of rising prices and competition was responsible in large measure for the overwhelming success of the furniture industry's first Fair. More than 1,700 people from the furniture and woodworking industries

Serving the Industry Since 1852

It's Masterful!

This 6" LAG BED ELECTRIC MOULDER

built by "The Moulder of Woods"®



WOODS' 137M MOULDER

WOODS' 137M MOULDER

shown with hopper feeding attachment
Feed rates to 160 f.p.m.

Modernize to Economize!

A moulder adapted to every woodworking plant that does moulding work of any kind; furniture, cabinets, chairs, trim and interior finish.

When this S. A. Wood's 137M Moulder is installed in your plant—you have acquired one of the finest woodworking machines available to the industry. You will then enjoy a real competitive advantage in realizing a substantial increase in top quality production at reduced costs.

Among the many Leaders in the Industry that operate the 137M Moulder to secure these benefits are:—

BAY VIEW FURNITURE CO.
Holland, Michigan

BUFFELEN LUMBER & MFG. CO.
Tacoma, Washington

METLER BROTHERS
Klamath Falls, Oregon

MISSOULA WHITE PINE SASH CO., INC.
Missoula, Montana

STEPHENSON MILLWORK CO.
Wilson, North Carolina

WASHINGTON LUMBER CO.
Bowling Green, Virginia

S. A. WOODS MACHINE CO.

27 DAMRELL STREET

BOSTON 27, MASS.

Branch Offices: ARK., Little Rock CALIF., San Mateo N.Y., Mount Vernon
ORE., Portland TENN., Memphis VA., Richmond

Canadian: B.C., Vancouver, Akhurst Mchy. Co. ONT., Galt, Canada Mchy. Co.

Export Dept. United States Machinery Co., 90 Broad St., New York City

turned up for the Fair; 120 leading suppliers and exhibitors had displays filling every corner of the air-conditioned Exhibition Hall in the Conrad Hilton Hotel.

During the convention more than 20 experts from all fields of business administration, sales management, labor relations, research, and production warned manufacturers against being complacent in times of rising sales and falling profits.

"While furniture production can easily double in the next ten years, manufacturers must put added effort into training sales people and into providing tested selling aids on the retail level," John Snow said.

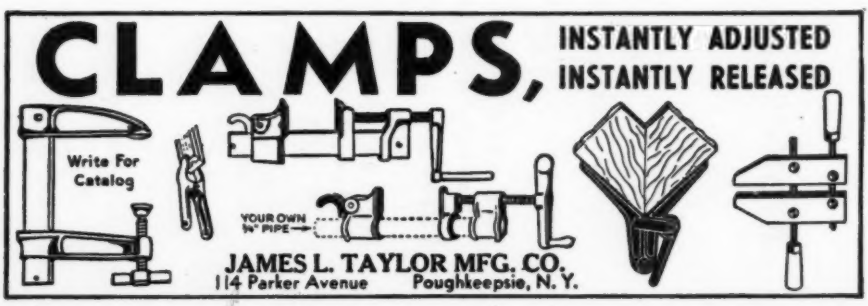
DOUBLE FURNITURE VOLUME PREDICTED

"By 1960, furniture manufacturers could increase their market at least 65% over present levels," Arno Johnson, vice president and director of research for J. Walter Thompson, told the National Association of Furniture Manufacturers.

Mr. Johnson's analysis of the huge new market waiting for all manufacturers is based on certain indisputable facts and trends. The rapid increase in the number of U.S. families and the trend to larger families (67% more children under 5 years of age now than in 1940) is a primary consideration. And these families are constantly climbing upward in income level—meaning a vast increase in discretionary spending power. For example, just between 1950 and 1954, the number of families with over $4,000 income jumped from 12.2 million to 21.4 million—and should climb to 36 million by 1960.

Mr. Johnson supported his thesis with an explanation of the President's Economic Report to Congress in January 1955. "President Eisenhower gave a measure of the opportunity and the selling job for the next 10 years by pointing out that 'our country can within a decade increase its production from the current annual level of about 360 billion dollars to 500 billion or more, in dollars of the same buying power.' This means," Mr. Johnson explained, "a major increase in living standards, increased total sales of goods and services to consumers by about $104 billion to a minimum level of $350 billion. The furniture industry, to keep pace, will have the opportunity to sell about $7.2 billion of its goods—double the present level of sales—to consumers in 1965."

The possibilities are there—a "huge



new market" lies waiting, Mr. Johnson said. The trouble lies in a "discouraging slackening in aggressiveness of forward planning, of advertising and promotion activities." The basic move for the furniture industry, as well as others, is to educate these moving mass millions. Used to a pre-war standard of living, they must be taught to "live up" to their newly acquired wealth, to match living standards with money earned.

"There is a vast educational job to be done if concepts and tastes of those millions who move up in purchasing power are to be brought up to the level of their new environment. Advertising is an educational force that can help the furniture industry hold its position in the new economy of higher living standards. There are already powerful allies in this educational job—service magazines have printed a wealth of educational material for their readers. For example, 15 billion pages were printed or distributed in 1954 by just six women's service magazines."

The furniture industry should look to a vast potential. Between 1940 and 1950, Mr. Johnson cited, consumer expenditures for furniture increased 186%. A substantial sum—but discretionary spending power grew 308%.

With these trends—the movement of mass millions to higher income levels, the trend to increased family and home life in America—real expansion of opportunity for the furniture industry can come in the years ahead. Mr. Johnson closed with the challenging statement: "The whole industry might well raise its sights to a new understanding of the opportunities for growth that exist in our changed American economy."

FIELD

CHAIN MORTISE

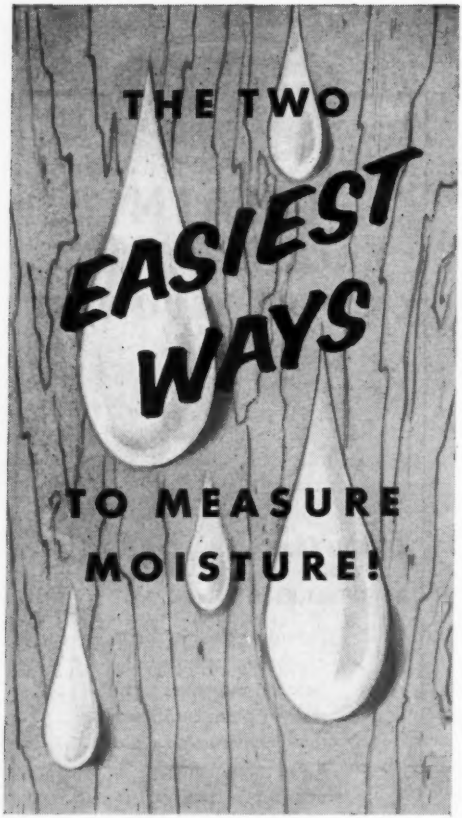
CUTTING EQUIPMENT

A TOOL ROOM Product
By A Tool Room Expert!

Use our double bearing guide bars for flat bottom mortises. The riveted plate and bearing construction provides the utmost in strength and interchangeability. More than 90 standard and many special sizes of cutting equipment in stock. We are well-equipped to furnish special sizes like the above bar in many widths and lengths.

Write for complete information on our chain mortising equipment.

WILLIAM H. FIELD CO.
327 Dorchester Ave. Boston 27, Mass.

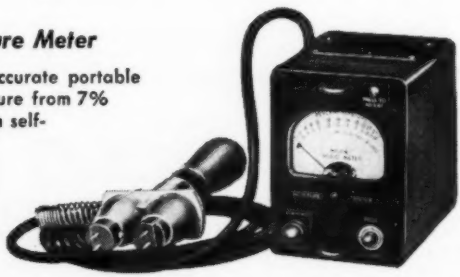


WESTON *ALL-PURPOSE*
MOISTURONIC
Moisture Meter

Here is the most versatile moisture meter, yet the simplest and easiest to read. Measures up to 150% moisture on the double-range scale (readings above 30% for comparative purposes). Utilizing the precise resistance principle, it has the same dependability typical of all WESTON instruments. Available in both battery and A-C types, with a sturdy carrying strap. Weight less than 10 lbs. Send for bulletin W7B.

WESTON *Midget Moisture Meter*

The smallest, most convenient and accurate portable meter. Instantly indicates wood moisture from 7% to 30%. Weight less than 4 lbs. with self-contained batteries. Unequalled for quick, portable use—checking lumber, lath, shingles, plaster walls, plywood, etc. Send for bulletin W2C.



WESTON *Moisture Meters*

WESTON Electrical Instrument Corporation, 614 Frelinghuysen Ave., Newark 5, N. J.

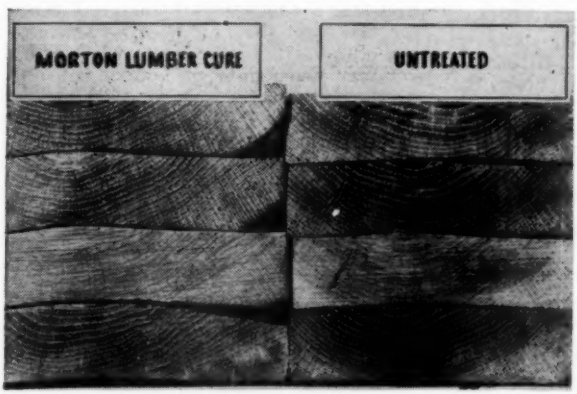
Seasoning with Morton's Lumber Cure

Seasoning defects, such as surface checking and honeycomb, have always been a problem to the lumber industry. These defects cost the country millions of board feet of lumber annually, with a resulting loss of millions of dollars. This loss is suffered first by the lumber producer and later by the secondary manufacturing plant.

Much has been done throughout the years to reduce seasoning losses. Better piling methods and more efficient kilns have contributed greatly toward solving this problem, while another approach of recent times has been through chemicals. A number of chemicals have been tried and used. This article discusses the Morton Lumber Cure.

Morton Lumber Cure, a product of the Bay Chemical Company, Division of the Morton Salt Company, 120 S. LaSalle, Chicago, Ill., works like this—Lumber, as you know, dries from the surface to the center, causing shrinkage in the surface, while the core remains moist and swollen. The resultant stresses and strains are responsible for the surface checking and honeycombing occurring in the lumber. Morton "Lumber Cure" reverses this action, and the lumber dries from the inside out. Treated lumber dries as rapidly and in some cases more rapidly than untreated lumber, but the stresses and strains are reduced by this change in moisture gradient. Kiln schedules can be speeded up with no lowering in quality of the lumber produced, or the regular kiln schedule can be followed to raise the quality of the lumber.

Here are some examples showing commercial tests made with Morton Lumber Cure. One such test involved 6 M.B.F. of 8/4 mixed red and white southern oak. The lumber was graded green, and half was treated with Morton Lumber Cure, while the other half was left untreated. The lumber was air dried, then kiln dried, then regraded, and only those defects resulting from seasoning were considered. Seasoning checks less than ⅛" in depth were not considered, and checks not visible after kiln drying were not recorded. Under these conditions, at the end of the kiln drying period the untreated 8/4 oak suffered a 14.84% greater loss than the treated 8/4 oak.



End-checking when drying boards under the same conditions — some have been treated with Morton Lumber Cure and some left untreated.

Peck, Baker and Carter (Forest Prod. Lab. Report No. R-1708) tested Morton Lumber Cure on 2" beech bars. In factory tests 152 shaving soap bowls per M. linear feet of untreated beech stock were rejected for air seasoning defects compared to 62 per M. linear feet of beech treated with the Morton Lumber Cure.

The emphasis has been primarily on hardwoods; however, some work has been carried on with softwoods. Recently a test was conducted at a mill involving 2500 B.F. of yellow pine 2x4's. The lumber was all graded green as No. 3 because of density. Then 1650 bd. ft. were treated with Morton Lumber Cure and kiln dried, while 865 bd. ft. were left untreated and dried in the same kiln for a control. The lumber was regraded dry, disregarding any defect that could not be attributed to seasoning. Notice in the following results the higher percentage of No. 1 and No. 2 grades in the treated stock.

Grade	Morton Lumber Cure Treated	Untreated Control
1	13.32%	11.31%
2	57.14%	45.49%
3	29.54%	43.19%

This lumber was all selected as low grade. On higher grades or mill run the benefits could be expected to be even greater.

Morton Lumber Cure is a preseasoning treatment. The objective is to impregnate the outer zone of the lumber to a depth of about 1/10th thickness. With highest concentration near the surface, Morton Lumber Cure keeps the outer part of the wood at a moisture content higher than that of untreated wood while drying, while the water attraction properties of Morton Lumber Cure keeps the treated outer zone more moist. Shrinkage tendency of the outer zone is thereby reduced, and surface checking is decreased without interfering with drying.

The dry spread method of application is the most commonly used and has proven to be the most effective. This method makes it easy to treat only the grades and species of lumber which need treatment and requires no special equipment or installation. The lumber, of course, must be treated green.

To apply the chemical, lay down a course of lumber and cover with the recommended amount of Morton Lumber Cure by spreading the crystals over the surface. Then lay down another course of lumber, apply Morton Lumber Cure to this layer, and continue in this manner to build up a bulk pile. Keep the pile flat and level and cover with a roof. The lumber should be allowed to stand in the bulk pile until the Lumber Cure crystals have dissolved; then the lumber can be restacked for ordinary air or kiln drying and dried in the conventional manner.

Wood treated properly with Morton Lumber Cure does not possess any marked differences with regard to hygroscopic tendencies or working and finishing characteristics than untreated wood. Hygroscopic studies made with exposures out-of-doors, in a constant humidity chamber, and in a steam chamber showed no significant difference between Morton Lumber Cure treated specimens and untreated matched lumber. In the various machining operations, such as planing, boring, sawing and jointing, no difference is noted between treated and untreated material with regard to machinability. Neither does the treated lumber have any dulling effect on the blades of woodworking equipment. Treatment with Morton Lumber Cure does not effect the adhering qualities of paint, varnish, or lacquer finishes. There is no discoloration of wood by treatment with Morton Lumber Cure, but where stain and mold control are necessary, an anti-stain chemical, such as Diprite, Santobrite S or the like should be applied by dipping or spraying before applying the Morton Lumber Cure.

Morton Lumber Cure is being used in many active commercial sawmills and concentration yards throughout the country with excellent results.

Chicago

IN
THE HEART
OF THE LOOP

HOTEL
HAMILTON
20 S. DEARBORN ST. at MADISON

CHECK THESE FEATURES

- √ VERY LOW RATES
- √ CLEAN COMFORTABLE MODERN ROOMS
- √ A FAMILY HOTEL COME AS YOU ARE
- √ ONE BLOCK FROM STATE ST. SHOPPING
- √ A FEW BLOCKS FROM ALL ENTERTAINMENT
- √ 3 MINUTES FROM THE FINANCIAL DISTRICT
- √ FREE RADIO-TV AND AIR CONDITIONING AVAILABLE
- √ PARKING JUST A FEW BLOCKS FROM HOTEL 60c OVERNITE
- √ CRIBS FOR THE BABIES—COTS FOR THE CHILDREN

ALL THIS

FROM **$4** SINGLE AND UP

INFORMATION — RESERVATIONS — WRITE

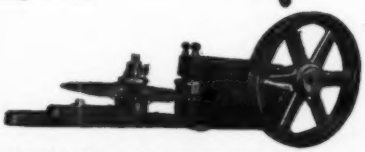
SAM LEEDS, Mng. Dir.
Box 100

Hotel HAMILTON

Sharpens, bevels each tooth as it comes along

ONLY Y 18 HAS THE AUTOMATIC SWIVEL

Only the Y 18 can sharpen cross cut saws in one operation. Automatic swivel enables each tooth to be sharpened as it comes along. Eliminates a second set up. Every bevel is uniform, all points balanced. Sharpens rip saws too. Write for bulletin describing Y 18.



AC 38 CIRCULAR SAW SETTER
Sets teeth at a speed of 150 to 200 per minute on saws with diameters from 5" to 38".

WARDWELL
MANUFACTURING CO.
3806 Ridge Rd.
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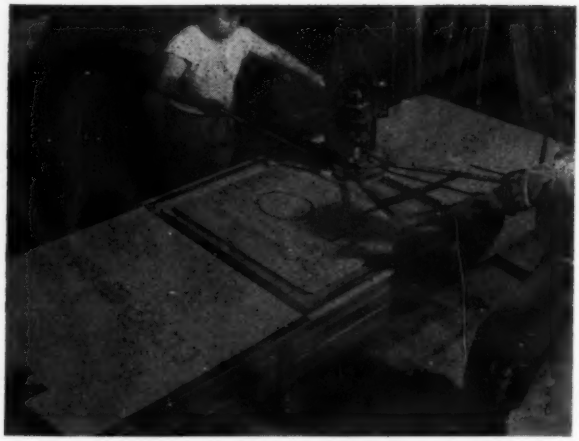
Maker of largest line of saw filing machines.

National Homes Cuts Openings With Portable Routers



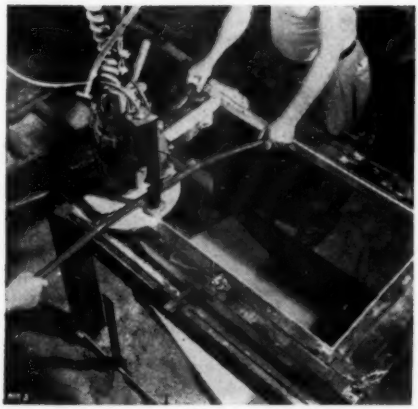
Photograph 1. Router has been lowered and two operators will follow steel edged pattern.

Utilizing two Onsrud W215 portable electric routers, National Homes, Lafayette, Indiana, cuts 4,000 window openings per five day week. These openings are cut in wall panels and doors.

Photograph No. 1 portrays two wall window openings being cut simultaneously in two thicknesses of 5/8" plywood. A steel edged plywood pattern is placed over the two wall panels. The panels and pattern are held in place with stationary guides located on the edge of the work table.

The router is suspended overhead by a weight and pulley system. When ready to rout, the two operators merely pull the router down into position and follow the pattern for the window openings. This is an extremely efficient operating procedure as the balance between the pulley system and the router

Photograph 2. Pulley system for router and completed window opening in two wall panels.



Photograph 3. Window opening completed on an outside door.

is so precise the operators exert very little pressure to pull it into position. Therefore, the majority of their efforts are directed towards guiding the router.

Onsrud routers do not stall as they operate on the high cycle principle. The particular models used at National Homes operate at 250 cycle from a 3 kw frequency converter, incorporate a 5 h.p. motor and turn the cutter at 15,000 r.p.m.

Photograph No. 2 shows the completed window opening in two wall panels.

Photograph No. 3 shows a window opening completed on an outside door. These are cut in a similar method to the wall window openings, but one at a time, as the single cut has a depth of 1¾". It is interesting to note that 2% of all homes produced in this country in 1954 were National Homes.

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On many difficult sawing jobs, VICTORY carbide-tipped saws are cutting 40 to 100 times longer than ordinary saws before sharpening. Users also experience less down-time on machines and benefit thru reduced sharpening costs. Be sure to investigate these advantages for your plant.

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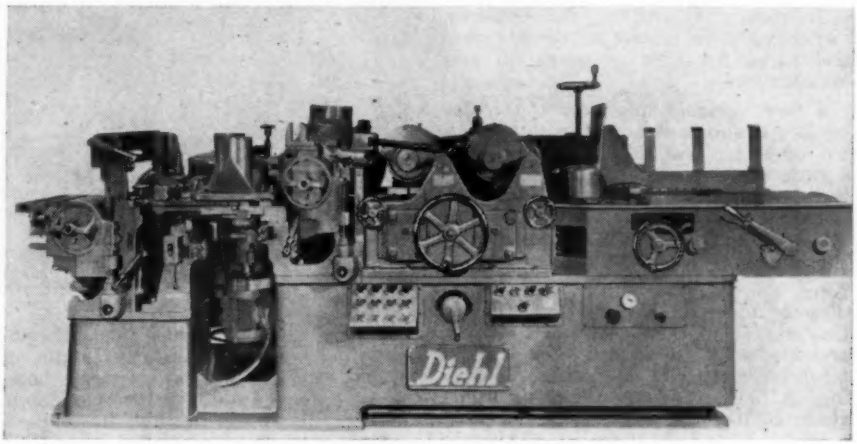
EQUIPMENT AND SUPPLIES for the WOODWORKING INDUSTRY

DIEHL 12" MOULDER



An all-new 12" moulder designed for continuous operation at high speeds has been announced by the G. M. Diehl Machine Works, Inc., Wabash, Indiana, manufacturers of precision woodworking machinery.

Incorporating the streamlined design of the recently announced Diehl 6" and 8" moulders, this 12" model adds the flexibility offered by the larger capacity machine. Also included among the new features are: new spring preloaded spindle bearings to eliminate both end and radial play; optional double-tapered detachable spindles; optional mixed spindle speeds up to 7200 r.p.m.; cast aluminum dust hoods, new lightweight jointing devices; new variable speed drive; optional air controlled feed roll pressure system; integral input worm shaft under worm wheel in the feed works assembly; separate electrical control panel; massive rigid base; and new chipbreaker arms.

The standard integrated spindle features new number two series, super-precision bearing relocated 2" closer to the stator and rotor load, and ½" closer to the cutterhead load. Spring preloading with 200 pounds of pressure applied directly against the bearing recess eliminates the possibility of end and radial play. The spindle has been increased ¼" in outside diameter at the point of bearing mounting.

The standard control panel houses all

controls and includes two starters for forward, two for brakes . . . and overload relays protect against overloads and low voltages. Overload relays are placed in series, causing all motors to stop when any one overload relay kicks out. Cutterhead motors may be switched from 60 to 120 cycles. A guardian relay prevents accidental starting if frequency changer is turned on after starter button is pushed.

An optional feature at extra cost on the 12" model is mixed spindle speeds. Control panel is mounted on the machine so that operator can select on any or all heads, either 3600 r.p.m. from the primary circuit, or 7200 r.p.m. from a frequency changer. All controls, switches and relays are in a single control panel for ease of operation and maintenance.

A new variable speed drive unit assembly is standard equipment. The 7.5 h.p. or 10 h.p. variable speed drive has a ratio of 7.9:1, and provides standard speed feeds from 20 to 151 f.p.m. Optional feed speeds available at extra cost go to a maximum of 350 f.p.m.

The new feed works assembly features an integral input worm shaft directly under the worm wheel. Distortion or deflection are prevented. Worm, and bottom 2" of worm wheel run in oil in large capacity oil-tight gear housing. A new gear-type swivel actuating chain tightener is completely enclosed.

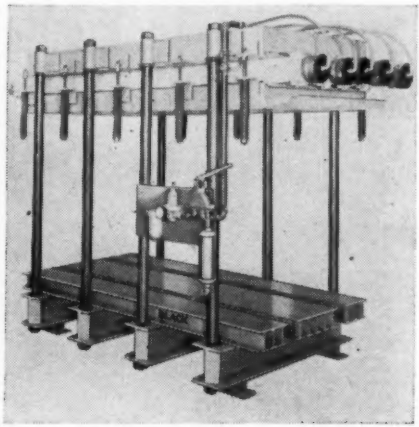
The new air hold-down controls air pressure on the top feed roll mechanism. Feeding may be varied from 0 to 150 pounds pressure. The air control system operates on a line pressure from 30 pounds minimum to a maximum of 110 pounds.

Entirely new lightweight jointers made of nickle-steel alloy have been incorporated into the new 12" Diehl Moulder. New cast aluminum dust hoods are extremely durable, easier to handle and their gradual radii and curves prove most efficient in chip removal.

You can read some folks like a book, but they don't shut up as easily.

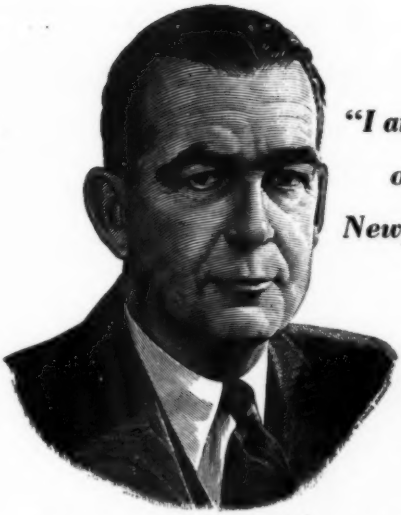
THE AIR HOSE PRESS

A new type of laminating press by Black Brothers, Mendota, Ill., used in the fabrication of hollow core flush doors, plastic faced table and counter tops and many other laminating operations is unique in principle, positive in action, moderately priced and engineered with care.



Air pressure introduced through suitable controls into several units of closely spaced, special oversize hose, located above the upper movable platen, actuates the press through the expansion and contraction of the hose. The approximate maximum expansion of the hose is 4", normally a 2" stroke allows enough clearance to load the press and take up the looseness of the press load. This stroke will deliver about 60 p.s.i. over the platen area based on 100 p.s.i. shop air pressure.

The lower fixed platen is made out of closely spaced I-beams levelled and planed over which is welded a substantial steel plate. The bottom platen is backed up by heavy, wide flanged structural I-beams. Several oversize steel strain rods tie the upper and lower parts of the press together. The pressing load is thrown in pure tension on these strain rods, thus no load is transferred to the floor and no special foun-



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More than 45,000 companies offer their employees the Payroll Savings Plan. In many of these companies more than 60% of the employees are Payroll Savers—in some, participation is 75%, 80%, and higher.

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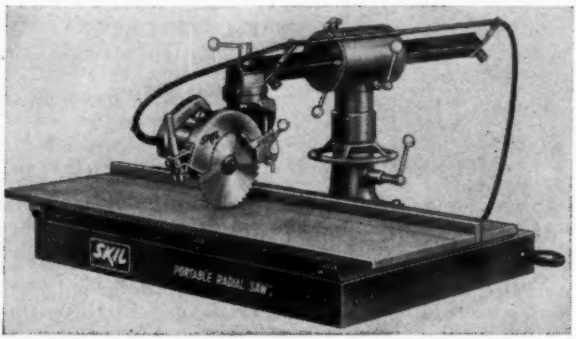
dation is required. Several high strength steel springs are used to retract the moving platen automatically after the pressing cycle has been completed.

The loading of the press is expedited through the use of spring type roller loaders consisting of two tracks with closely spaced rollers supported by stout springs which hold the top of the rollers above the lower platen permitting the package to roll into and out of the press. The tracks recede when pressure is applied allowing the package to make full contact with the lower platen. After the pressure is released the track raises the package allowing it to be rolled out of the press.

The Air Hose Press can be supplied in platen sizes ranging from 30″x30″ to 50″x120″.

PORTABLE ELECTRIC RADIAL SAW



Skil Corporation, pioneer manufacturer of the portable electric handsaw, has added another new tool to its line—a portable electric radial saw, which weighs only 169 pounds.

An unusual feature of the new tool is that it will operate on direct as well as alternating current.

The saw is conservatively rated at 1½ h.p. It has a free speed of 5,700 r.p.m.; its depth of cut is 3-1/16″; its straight cutoff capacity is 18″, and it has a rip capacity to the center of a 48″ panel. Cut offs to 12″ can be made up to 45 degrees. The blade diameter is 8¼″.

Accessories for the radial saw include a set of four legs to convert the portable unit into a stationary installation; a lower safety guard, and a sander-shaper kit. The kit consists of expanding rubber drum and ten sanding collars of assorted grits; three high-speed steel shaping cutters for tongue, groove and face-joint cove cuts, and a mounting arbor and six spacing washers. Other shaping cutters for a large variety of cuts are available.

LIGHT-DUTY ROLLER COATER

A new light-duty roller coater is announced by the Union Tool Corporation, Warsaw, Indiana. Identified as Model No. 5, this line of light-duty roller coaters is an addition to the company's regular line of larger models.

Specifications are as follows—Frame: rugged steel electrically welded and rigidly joined and trussed to eliminate vibration and to assure positive alignment of rolls. Motor: ¼ h.p. with chain drive. Bearings: self-aligning ball bearings well shielded from coating materials. Rolls: neoprene, buna or gelatin covered 4″ dia. coating rolls; 2¾″ dia. plated doctor roll. Four production types are offered: 5-A and 5-B are

THE POWERMATIC
MODEL 50-6'' JOINTER FEATURES

The longest bed on the competitive market

This new production type jointer is actually LOADED with features. The extra long 48" bed assures perfect edges no matter how long the board. Knife setting in a Jointer has always been an extremely difficult task, but the Model 50, standard equipped with "jack screws" in the cutterhead, allows quick adjustment in a minimum of time. An exclusive new center mounted fence features a positive lock at 45° and 90°. The rigid center mounting prevents uneven edges common in end mounted fences.

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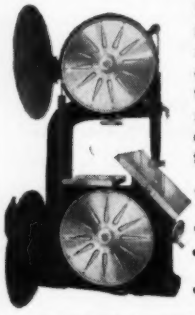

Fay & Egan Bandsaws, No. 950—36" model, cut production costs, time and troubles. Rugged construction means years of low-cost, trouble-free service.

- Carter demountable-type wheels
- Full safety guarded
- Fine balance for quality work
- Metal cutting models available

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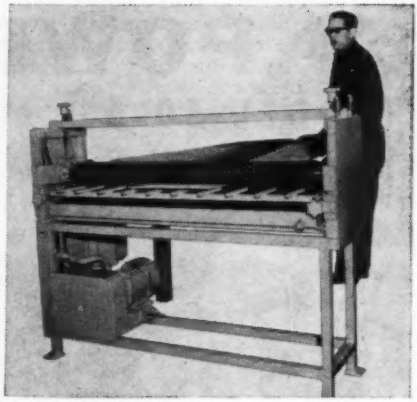


double coaters, each having two coating and two doctor rolls; 5-C top single coater and 5-D bottom single coater are equipped with one coating roll, one doctor roll and one backup roll.

Rolls are available in standard lengths of 14", 26", 38", and 50". Screw-type feed adjustment is positive and accurate, assuring precise control of thickness of application. Standard models are built to run at 75 l.f.m.; other speeds available as desired.

AIR-POWERED STRAPPING MACHINE

Signode Steel Strapping Company offers an air-powered strapping machine that automatically tensions strapping and then seals and cuts it off in two easy motions. This semi-automatic Model AP tool is unexcelled for fast, efficient strapping of skid and pallet loads.

Power driven—taking all the effort out of tensioning steel strapping—it speeds the entire operation by eliminating the major cause of operator fatigue. It provides uniform, predetermined tension which may easily be adjusted up to 1600 lbs. The Signode Model AP tool is precision engineered

to furnish extremely high joint strength and is ruggedly built for low maintenance. It is designed for use with 5/8" or 3/4" Signode Steel Strapping.

For further information write Signode Steel Strapping Company, 2600 North Western Avenue, Dept. 9P, Chicago 47, Illinois.

BAND SAW BLADE

A new band saw blade with positive rake teeth, known as the "Lenox" hook-tooth blade, has been developed by the American Saw & Mfg. Company of Springfield, Massachusetts. This new blade is recommended for cutting wood, non-ferrous metals, and plastics.

Positive rake teeth have a forward inclination, so that they "hook" themselves into the work, to cut with greater ease than the conventional zero rake band saw teeth. The hook-tooth blade will take higher cutting feeds.

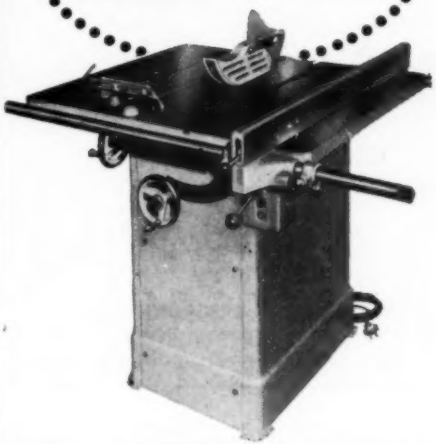
While the conventional band saw blade breaks a path through the work, Lenox hook-tooth cuts the layers of wood, takes big, full chips, and clears them quickly, it is said.

The new blade also features the Lenox rounded gullets designed for

new

heavy duty

10" TILTING ARBOR SAW



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Big, rugged, safe, powerful, precision machined for utmost accuracy. Check these features: Operates from 1 or 1½ H.P. motor . . . has 3 belt drive utilizing full motor power . . . extra heavy trunions for rigidity . . . large ground and polished table top . . . improved front and rear locking rip fence . . . tubular guide bars increase table capacity to 44½" . . . graduated scale on front bar . . . blade tilting and raising wheels lock securely . . . specially designed mitre slot "holds" gauge and prevents accidental dropping . . . snap-out base panel for sawdust removal, plus others.

SPECIFICATIONS: *Table top 33"x38" with ext.; depth of cut 3¼"; at 45°—2-7/16"; 5/8" spindle mounted on sealed ball bearings; standard equipment includes: deluxe mitre gauge, throat insert, rip fence, comb. blade, guard, splitter, anti-kick back, switch bracket, motor pulley and V-belts only* $320.

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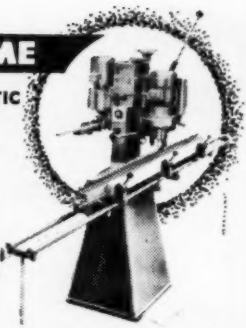
WINDOW
SHUTTER
GROOVER
MAKES RIGHT
& LEFT STILES
AT ONE TIME



One unskilled operator can now make perfectly paired and matched shutter stiles in one operation, assuring perfect matching. Handles stiles up to 7' 1". Groove length, spacing and depth easily adjusted in minutes. Write for details on this low priced machine.

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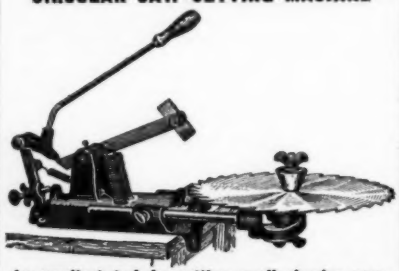
50-52 Howard St. New York 13, N. Y.

SIMPLEX
CIRCULAR SAW SETTING MACHINE



An excellent tool for setting small circular saws. The successful operation of all circular saws depends largely upon the manner in which they are fitted.

To obtain the best results the teeth should be properly and evenly set.

This machine does the work perfectly, insuring easy and true running and smooth cutting.

The hammer strikes every blow with equal force and at the same angle hence the set of each tooth is absolutely uniform. Will give a light, medium or heavy set.

Adjustable for saws, either rip or cut-off, from 5" to 24" in diameter.

The machine will last for years if handled with ordinary care and intelligence.

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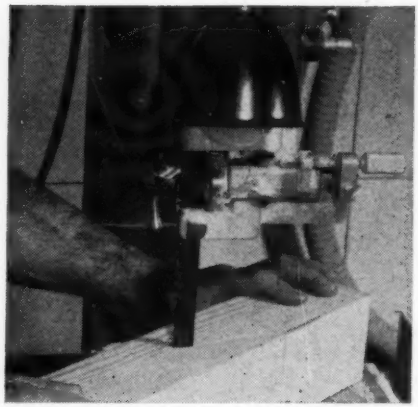


maximum chip clearance.

Blade teeth are flame-hardened to 63-65 Rockwell C for top cutting strength. The tough, flexible blade back is 25-30 Rockwell C.

Lenox hook-tooth band saw blades are available in ½" to 1" widths, from two to six teeth per inch. Packaging includes 100', 250' and 500' coils, also blades cut to length and welded.

MATER TONG DOG

For mill operators who need modern non-defacing, fully oscillating tong dogs but don't need an entirely new carriage or headblocks and knees to go with them, Mater Machine Works, Corvallis, Oregon, has put out a new air tong dog conversion kit. Completely packaged in easy-to-install form, the Mater tong dog kit uses the same type of engineered dogs which are built into highest quality carriages.

The Mater tong dogs have a positive grip without defacing boards and oscillate fully to dog large logs or down to a 1" backstand. The positive dogging has been found particularly useful for dogging small slippery and frozen logs as well as large logs.

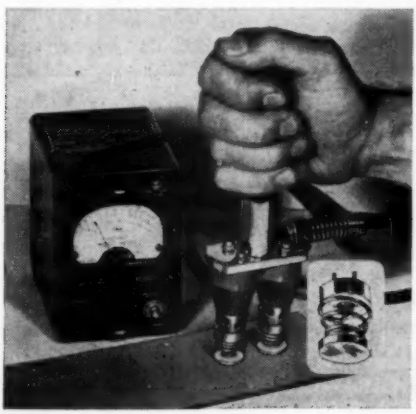
Completely packaged with all re-

quired cylinders, air hoses, valves, and pipes the Mater tong dog conversion kits are designed to be installed by the millwright at the mill site over a week-end shut down. Installation directions are supplied with each kit. Mounted in steel cases which can be welded or bolted to the knee, the tong dog assemblies for each knee are completely separate units so that the mill operator can convert one, two or three knees to tong dog operation.

The kits are available for setter control or remote-controlled operation by the sawer and can readily be put on knees equipped for taper sawing. Tong dogs found early favor with pine mills where the soft wood and high cost of defaced lumber made non-defacing dogs imperative. Current lumber manufacturing conditions have made non-defacing tong dogs important for all species.

WESTON WOOD MOISTURE METERS

This new spring contact attachment is now available for all Weston wood moisture meters. It is claimed to provide greater deflection and more accurate and steady readings when the meter is used on thin materials or materials whose readings are normally very low.



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'SKIP-TOOTH"

Unsurpassed for fast clean cutting of hardwoods, softwoods, plastics, fibre, wood substitutes.

REGULAR

For all types of band saw machines. Furnished cut to length and welded or in coils in handy reel dispenser.

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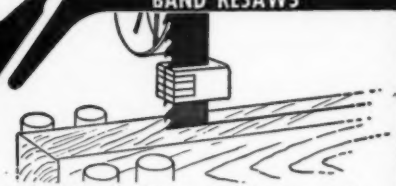

"Filer Finished" — Ready to use!
Try 'em, you'll like 'em.
LOG BANDS NARROW BANDS

To use the attachment, it is merely necessary to remove the needles from the probe, and insert the spring and tighten. The unit is available from Weston Electrical Instrument Corporation, 614 Frelinghuysen Avenue, Newark 5, New Jersey.

MACHINE FOR DOOR MANUFACTURERS

An automatic machine for routing hinge pockets, boring lock holes and mortising lock plate openings has recently been developed by the Novi Tool & Machine Company of Novi, Michigan.

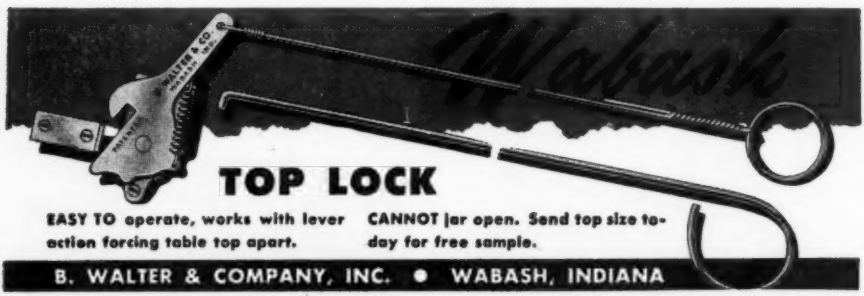
The machine is adjustable for performing these operations on all doors, both right and left hand, having a thickness of from 1⅜" to 1¾", widths from 18" to 3' and heights from 6' to 8'.

All of the operations mentioned above can be performed at the rate of from 50 to 60 doors per hour with unskilled operators.

ONE COAT OF HOT SPRAY

Beverage case painting has always presented a coverage problem because cost factors prohibit extensive preparation on new or old wood. Under conventional spray systems these cases require two separate coats, allowing up to 24 hours drying time between coats. The "one coat" hot spray application now used by a large bottling company in Houston, Texas is giving a full coverage film and reducing the holding time by as much as 50%, it is claimed.

It is said that the blasting effect of conventional spray application due to high atomizing pressures is reduced to an even "flowing on" of high solids, low solvent content materials as a result of a lower atomizing air pressure requirements of the hot spray process. Wasteful overspray is reportedly reduced by as much as 25% and the better film build and hold out on new or used beverage cases have improved the appearance and extended the life of the cases. Repainting interval is said to be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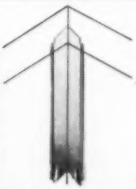
B. WALTER & COMPANY, INC. • WABASH, INDIANA

The DUBLE VEE TRADE MARK



Miter Joint Fastener

• A special type of Wood Joint Fastener for a special purpose. The inverted "V" top of the DUBLE-VEE fastener neatly fills the miter flush, eliminating need of any fillers. This is a plus value in addition to the many time, labor and material savings for which all styles of our Wood Joint Fasteners are famous. It eliminates gluing—the time-consuming operation of applying and removing clamps—returns valuable floor space, formerly provided for drying of work, to production and greatly reduces production time per unit produced. Your net result is a sturdier, higher quality product you can market with an important price advantage. Send for complete information.

Fills as it Joins

CLAMP NAIL COMPANY
4542 West Palmer Street Chicago 39, Illinois

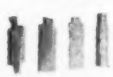
lengthened and total refinishing costs have been reduced.

These new all-electric hot spray paint heaters are now in standard production at the Spee-Flo Corporation, 720 Polk Avenue, Houston, Texas.

MILLER EXPANDS PROGRAM

Over 7,500 different cylinder selections are now carried in stock for immediate shipment to meet the "rush" needs of power cylinder users, by Miller Fluid Power Company, 2040 N. Hawthorne Ave., Melrose Park, Ill., manufacturer of air and hydraulic cylinders, boosters, and accumulators.

The air cylinders are the standard Miller Model "A", 200 p.s.i., double acting cylinders and are carried in stock in 1½", 2," 2½", 3¼", 4", 5", 6", and 8" bores. Each of these bore sizes is available in over 15 convenient mounting styles and, with the exception of the 1½" bore size which is available in strokes from 1" through 6", each different bore size and model are available in strokes from 1" through 36", both non-cushioned and cushioned both ends.



At Left

Style "C" Chucking Cutter — for Square Shouldered Pins ¼" to 1" Dia.

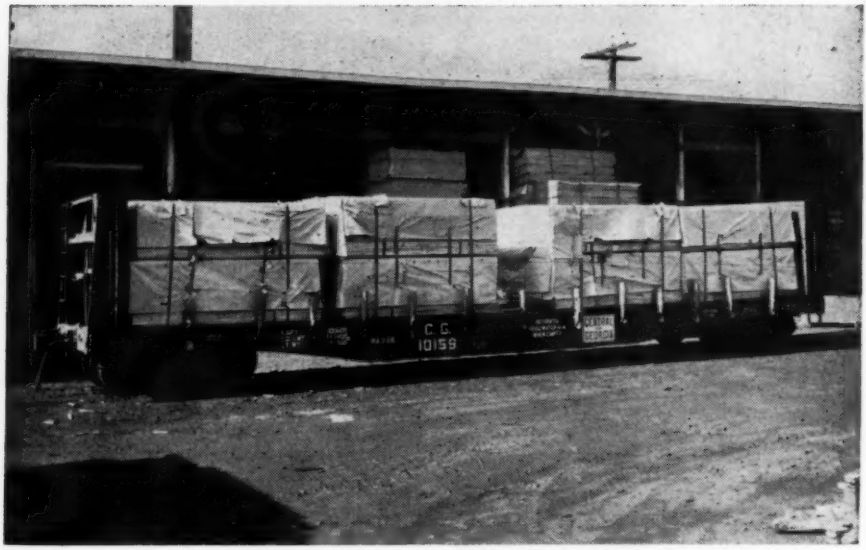
At Right

B-100 Two-Spindle Borer. 1" to 7½" Centers.

OTHER CUTTERS & BORERS TO CHOOSE FROM —SEE YOUR MACHINERY DEALER OR WRITE DIRECT TO —

NEWTON MFG. CO. Temple, Texas

Lumber Car of Future



An entirely new concept in shipping lumber, hailed as the lumber car of the future, will be one of the major attractions of the materials handling demonstrations and clinics to be held in connection with the Second Annual Retail Lumber Dealers Association Exposition in Cleveland, October 11-14, 1955.

The car has bulkheads on each end to keep lumber packages from telescoping off the ends. All lumber on the car is to be strapped into units and wrapped with reinforced waterproof paper or polyethylene film. Each wrapped unit is unloaded from the flat car and placed into storage without any handling by hand. Because the units are protected from the elements, they can be stored outside indefinitely. Several such cars are to be shipped from mills to the exposition, where they will be unloaded at specified times.

In addition to the flat cars of wrapped lumber there will be a four-day planned program of materials handling activities designed to acquaint dealers with the latest procedures in the mechanical handling of building materials.

Daily clinic sessions on important materials handling problems are scheduled. Dealers and industry experts will cover such important subjects as "Warehouse Trends and Design"; "How to Lay Out a Lumber Yard for Mechanical Handling"; and "How to Select and Choose Mechanical Handling Equipment."

Coming Next Month . . .

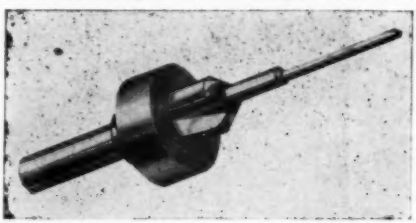
Stories of wooden ships . . . prefabricated home construction . . . moisture control.

"LEFTOVER" BURNER

Weyerhaeuser Timber Company's White River branch at Enumclaw, Wash., has disposed of its waste burner. The dismantled burner symbolizes progress in wood utilization. Elimination of the burner marks the end of a three-year construction program in which the plant expanded its utilization facilities through installation of a hydraulic debarker and erection of a by-product plant to convert low-value wood slabs and edgings into chips.

"6-IN-1" ADJUSTABLE DRILL

Here is a tool that drills . . . countersinks . . . counterbores . . . in one easy operation for every standard length of wood screw for hand power tools. It is usable for flat and round head screws; drills for screw thread portion; drills the body size of screw; drills countersink for screw head; drills counterbore for putty or wood plugs and is adjustable for every standard length of screw.



The drill is available from the Oxwall Tool Co., 938 Broadway, New York City.

He that would please all and himself, too, undertakes what he cannot do.

"UNI-COAT" RUST PREVENTIVE

Introduction of "Uni-Coat Rust Preventive Coating" is announced by Universal Door Carrier, Inc., specialists in kiln closure equipment for over fifty years. The company believes Uni-Coat offers a truly satisfactory rust preventive coating material for block racks, door frames, and other steel exposed to kiln conditions. In fact this product, developed specifically to combat rust problems in kilns, is useful for protecting steel wherever corrosive conditions are encountered.

Synthetic resins providing the base of Uni-Coat, makes the coating remarkably tough, resilient, stable, and impermeable. Uni-Coat has excellent resistance to abrasion and has qualities of impermeability and resistance to water, steam, grease, and most solvents, acids, and alkalis. Uni-Coat is supplied in industrial yellow only.

For further information, contact Universal Door Carrier, Inc., 1117 Cornell Avenue, Indianapolis 2, Indiana.

HARDWOOD MOLDINGS

This 4-page brochure by International Fibre Board & Plywood Sales, Ltd., Gatineau, Quebec, Can., shows 15 selected molding designs. Each style is illustrated and specifications given in diagrammatic form. The last page of the folder emphasizes how hardwood moldings such as these should increase again descriptive material is very clear and diagrams very helpful. Use of molding such as these should increase the utilization for hardwood plywood. The firm is prepared to supply the moldings such as these should increase States.

LIFT TRUCK GUIDE

A new kind of industrial equipment analysis and rating table similar to job and personnel rating techniques has been introduced by Hyster Company for comparison and selection of fork lift trucks. The plan, known as "How to Select a Lift Truck," is based on user evaluation of job requirements and truck features by points with a chart and analysis guide.

Thirty-six lift truck features are listed for comparison under the following headings: Performance, Ease of Operation, Durability, Serviceability and Appearance. The user self-rates each feature in points determined from a general ideal rating and from the user's own job requirements. Value of the manufacturer's sales and service organization are also user-rated.

Copies of the truck selection guide and the rating table are available at Hyster dealers or by writing for forms 1406 and 1411 to the Hyster Company, 2902 N.E. Clackamas, Portland 8, Ore.

CONVEYOR LITERATURE

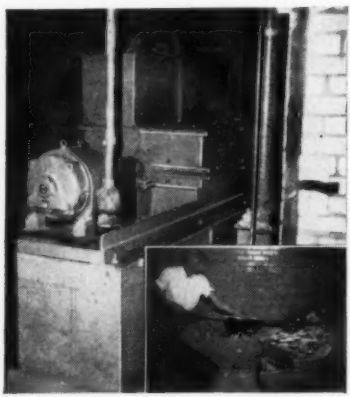
A new catalog on Series 60 medium and heavy duty roller conveyors has just been issued by the E. W. Buschman Company, Cincinnati 32, Ohio. Twenty

Burning WOOD SCRAP instead of COAL

saves this luggage manufacturer $6,000 annually on fuel bill

. . . . with help of

AMERICAN WOOD HOG



"We have fed as high as 3,000 lbs. of wood scrap per hour to this hog," writes this well-known luggage maker. "Since the installation of our wood-burning equipment *we have not purchased a single ton of coal* for boiler use! And the result in savings has amounted in excess of $6,000 annually."

WRITE for new WOOD HOG BULLETIN

American PULVERIZER COMPANY

1510 MACKLIND AVE. • ST. LOUIS 10, MO.

EXCUSE IT, PLEASE.

The September issue of WOOD WORKING DIGEST, page 185, described graphite coated canvas and its use on sanding machines. The canvas is used by a number of sanding equipment manufacturers, including the Curtis Machine Co. However, the picture used shows a Wysong & Miles sander, not a Curtis machine.

pages of data and specifications on the complete line describe the various types giving capacities of rollers and bearings. Detailed cutaway views show the dustproof and grease-packed-for-life bearings with true-labyrinth metal seal, as well as integral and plain ball bearings. The rounded ends, turned-in ends, swaged, and reamed straight ends of rollers are shown in angle frames, formed or structural channel frames, with charts giving roller and frame capacities.

Heavy duty type mobile unit for straight sections of roller conveyor is illustrated, also roller curves, spur sections, sliding switches, converging sections, vertical lift and horizontal gate sections in permanent and portable types. Installation views cover many industries and include roller conveyors combined with overhead cable, live-roller and vertical reciprocating lift, belt and other types of conveyors.

Please mention
WOOD WORKING DIGEST
when writing advertisers.

The first great gift we can bestow on others is a good example.

No. 45-20-16

THOUSANDS OF PROBLEMS HAVE BEEN SOLVED BY

DOIG AUTOMATIC NAILERS

Standard Doig Features

1. Anti-friction bearings.
2. Three separate motorized drives.
3. Nail feeder to handle nails from 1 to 3 inches without additional parts required.
4. Nail feeders to give 12 separate nailing combinations.

NEW FEATURES

A. Wheel on left allows operator to adjust back gage from operating position.
B. Solenoid trip permits operator to trip machine at any position desired.

WRITE TODAY. WE INVITE YOUR REQUESTS FOR FULL DETAILS

WILLIAM S. DOIG Inc.

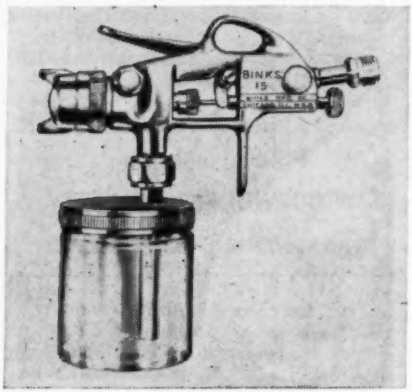
DEPT. 312 — 894 MANHATTAN AVE., BROOKLYN 22, NEW YORK

BINKS SPRAY GUN

This new lightweight Binks Model 15 spray gun, with its convenient overhead trigger, is ideal for all types of touch-up work and shading.

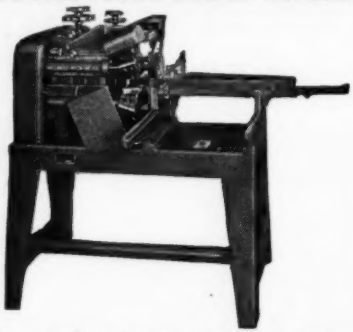
In this new model the air line connection is at the back of the gun (instead of on the side). This has two major advantages: First, it puts the weight of the hose on the arm where it can be easily supported. Operation of the gun for delicate shading or touch-up is more precise without the dangling hose. Second, it is much easier to reach into corners or awkward spots without having the hose in the way.

Also new is the 4-ounce glass siphon cup which makes it economical to apply small quantities of finish. Various finishes or colors can be stored in these glass jars by capping them with a tight lid.



HARRIS

DELUXE FLOOR MODEL TENONER



New adjustment allows exact and simultaneous adjustment of tenon spindles.
3 H.P. Motor
3 Inch Blades
V Belt pulley drive on both tenon and cope spindles.
Heavier Construction for greater accuracy.

MILLBURY MACHINE COMPANY
13 WATERS STREET, MILLBURY, MASS.

NEWMAN
HEAD GRINDER
Pedestal Type
G-16

FOR ALL CUTTERHEADS

Grinds all heads up to 11" in diameter and thick or thin knives up to 16" long

Double Spindle Grinding Head Two Grinding Wheels--- One flat & one saucer wheel

$495.00
F. O. B. GREENSBORO, NORTH CAROLINA

DETAILS ON REQUEST

WRITE TO-DAY

Table glides smoothly on roller bearings and moves vertically on worm gear rack & pinion drive.

FAST DELIVERY FROM STOCK

NEWMAN MACHINE CO., Inc.
GREENSBORO, NORTH CAROLINA, U. S. A.

TABLE SAW

A new model of the Wallace No. 11 saw with greater power, increased capacity, and new structural features is being produced by J. D. Wallace & Co., Inc., 1350 North Detroit Street, Warsaw, Indiana.

Retaining typical Wallace features of deep cuts with small blades, (11" blade cuts 4" thick) high arbor speed, and extremely large table surfaces, the following new features are stressed:

New drive units with increased power —up to 3-5 h.p.—silent "Powergrip" drive requiring no lubrication, and totally enclosed fan cooled motors.

Structural changes include new one-piece solid cast iron table and frame, new "expandable" rip extensions with solid ground surfaces, new cabinet type base providing unrestricted motor ventilation and freedom from fire hazard.

"Now madam," said the saleslady in the hat shoppee, "here's a number that will never go out of style. Ten years hence it will look just as ridiculous as it does now."

"Doesn't your new baby brighten up your home?" asked the gushy neighbor.

"I should say so," replied the new father. "We have the lights on all night nowadays."

44 Modern Units LInden 4-2400

The Beautiful New

Hillside Manor Motel

Adjoining Dining Room and Cocktail Lounge

"each perfects the other"

Roosevelt and Wolf Roads - Hillside, Illinois

30 Minutes Drive West of Chicago's Loop

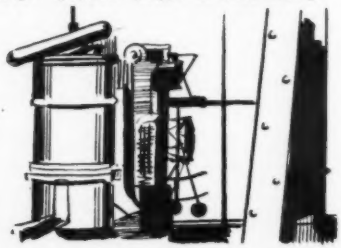
Mechanics Through the Ages

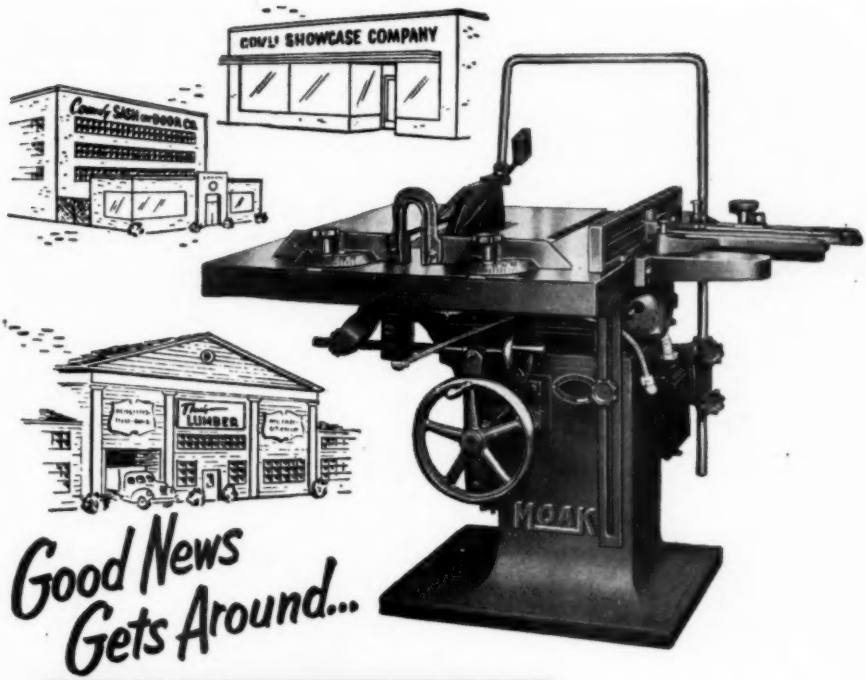
IN FASHIONING WOODEN COGS TO DRIVE THEIR MACHINERY, THE MILLWRIGHTS OF THE LATE 1700's PREFERRED TO USE HICKORY OR WHITE OAK THAT HAD BEEN CUT WHEN THE SAP RAN FULLEST, SOAKED IN WATER FOR A YEAR— AND ALLOWED TO DRY SLOWLY IN A HAY MOW!

AS LATE AS **1857**, IT TOOK A HAND WORKMAN **98** HOURS TO TURN OUT A **RIFLE BARREL!**

AL TREETZ

THE SMITH WHO FASHIONED THE CYLINDER OF WATT'S FIRST ENGINE OUT OF HAMMERED IRON USED QUICKSILVER TO MAKE IT AIR-TIGHT. BUT THE QUICKSILVER DROPPED THROUGH THE INEQUALITIES OF THE CYLINDER INTO THE INTERIOR WHERE IT "PLAYED HOB" WITH THE SOLDER.





Good News Gets Around...

Moak All-Purpose Saw Tables

TO CUT BOTH HEAVY MILL JOBS AND FINE SHOP WORK WITH UNERRING PRECISION

Capacity for cutting stock up to 5⅝" thick and accuracy for fine work are both available in this one machine—the Moak No. 16-A All Purpose Saw Table. Functionally designed throughout for efficient operation, Moak Tables raise, lower, or tilt at a turn of a hand wheel. Accurately graduated cut-off gauges adjust in V-slots machined in the polished semi-steel table; rip fence has rack and pinion adjustment. Choose from two models, three drives.

Get the facts **on Moak Saw Tables right away. Write for our colorful booklet.**

The Market Place

Rates for Classified Advertisements

Lists of Used and Rebuilt Machinery, either For Sale, Wanted, or For Exchange, set in uniform style, will be published in the Classified Section at the rate of $7.50 for name and address and a five line advertisement. For additional lines, only 75c per line.

DISPLAY ADVERTISEMENTS: 1 inch (Minimum), $8.50; 2 inches, $17.00; 3 inches (Maximum), $25.00.

Write directly to those offering the machine for sale, for prices and full descriptions. If what you seek is not advertised, write Hitchcock Publishing Company, 222 E. Willow Ave., Wheaton, Ill., making known your wants on either new or used machinery and the publisher will gladly assist you.

FOR SALE

S. W. Harrington, Inc.

P.O. Box 230 — **Asheville, N.C.**

Air Compressors, various sizes
Band Saws, Amer. 42", Belted MD
Band Saw, Greenlee No. 410, 36" bb, dmd
Band Saw, New Delta 20" bb-dmd
Band Saw, F&E No. 50—36" bb v-belt & motor
Blowers, Garden City 55"
Borer, Andrews 3 spindle vertical bed
Borers, Greenlee No. 369—5' DMD.
Borers, Greenlee No. 370 6 ft. horiz. dmd
Borers, Moak SS 2 Spindle horiz. dmd
Borer, W&M 283-B, bb, dmd, single spindle
Boring & Sawing, McKnight 26F dmd
Carvers, Y-A (U9) BB, DMD.
Clamps, Handy No. 71 revolving
Clippers, Coe 88" bed and motor
Dovetailers, Dodds, 20 spindle
Dowel Driver, Bell No. 8
Frequency changers, 30 KW and 33 KW
Glue Jointer, Diehl No. 66 bb-dmd
Glue Jointer, Jenkins No. 242A bb-dmd
Glue Spreaders, 12" Black Bros. dmd
Jointers, Porter Type C—24" BB, DMD.
Jointers, Glue, Yates-American No. 213 bb-dmd
Jointers, New Moak 12" bb-dmd
Jointers, Porter 16" and 24" bb-dmd
Jointers, Yates No. 199, 12" bb. v-belt drive
Kiln Trucks, 4' & 6', roller bearing
Lathe, Yates No. 74 bb-dmd
Mortiser, Sidney, single-spindle pb. bd.
Mortiser, New Britain No. 7 bd & motor
Mortiser, W&M No. 223—5 spindle Horiz. dmd
Moulders, Mattison No. 212, 6" bb-dmd
Moulders, Vonnegut 12" bb-dmd
Moulders, Yates-American C33, 8" bb-dmd
Moulders, Yates-American C-39—6" bb-dmd
Planers, Oliver No. 169, 30" double bb-dmd
Planer, Facing, Yates-American 36" with Jackson & Church feeder on base, bb-dmd
Planers, F&E—30" double, pb. bd & motors
Planers, Whitney No. 24—30" Dbl. BB, DMD.
Planers, Berlin 36" round head dmd
Planers, New Crescent 24" bb-dmd
Planer, F&E No. 156 36x7 dmd. round head
Planer-Matcher, Yates A1-15"x6" round heads pb. bd.
Redrier, Merritt 12 plate 36x72
Routers, Defiance single spindle high speed dmd
Sander, Yates No. 430, semi-stroke, bb-dmd
Sander, Yates No. 431—43" 3 drum endless dmd
Sanders, Niagara brush, bb-dmd
Sander, 48" double disc, dmd
Sanders, F&E 60" 3-drum roll feed, dmd
Sanders, McKnight single drum 24"x16" dmd
Sanders, Porter Cable vertical oscillating dmd. sgl. spdl.
Sander, W&M No. 171 belt bb., m.d.
Sanders, W&M No. 294 3 ft. stroke, bb-dmd
Saws, F&E No. 530, BB, DMD.
Saws, F&E No. 500 variety bb-dmd
Saws, Greenlee No. 493, variety, bb-dmd
Saws, Hermance Gang Rip, pb & motor
Eaglesfield Swing Cut-off Saw, BB, DMD.
Saws, New Delta-Crescent 12" tilting arbor dmd
Saws, New Multiplex 40A & 50A
Saws, Porter C-43, cutoff, bb-dmd. & tables
Shaper, Defiance double spindle, bb-dmd
Shaper, Whitney No. 329, double bb-dmd
Shapers, New Moak single spindle bb-dmd
Shapers, Greenlee No. 180 double bb-dmd
Shaper, Whitney double spindle, bb-dmd
Sticker, American No. 1, 1 side 4" pb. bed
Taping Machines, Dennis No. 2
Tenoners, Jenkins 95, double 72"x120", bb-dmd
Tenoners, Yates-American No. 55 single end, bb-dmd
Tenon Heads, single and double end
Tenoner, Hayes 6 ft. double with copes, pb. bd. & motor

Many other items, send your inquiries

HOLLOW CHISEL SHARPENING TOOL No. 830

For use in hand brace, made of High Speed Steel. Chisel is placed in vise and a few revolutions of tool fastened in hand brace produces sharp cutting edge. Burr is then scraped or filed off and corners are finished by hand with small square file.

WOODWORKERS' TOOL WORKS — 222 SOUTH JEFFERSON STREET — CHICAGO 6, ILL.

FOR SALE

Woodward Machinery Company
309 E. Second St. Cincinnati, 2, Ohio

Belt sander, American, wide surface, belt, $125
Belt sanders, roll table hand block, real bargains, $150 and up.
Blowers, Shaving 40 and 50 in., $100 ea.
Borer, Two spindle, vertical, M.D., $150
Borer, Bell gang, double end, dowel, $300
Dowel Pointer and Trimmer, Bell automatic, $300
Jointer, Cordesman 16 in., $135
Mortiser & Borer, American horiz., 5 hp, HC MD, $300
Planer, Towsley 26x8, sgl., good, $350
Planer, Single, 18 to 24", $175 and up
Ripsaw, Jenkins BB, heavy duty, straight line, $500
Radial saw, DeWalt 5 HP., sgl. ph., $350
Ripsaw, Barnes roll, self feed, $185
Saw, Roll table cutoff, $75
Swing Saw, Towsley DMD BB, $150
Tenoner, American No. 2-1-2 sgl. cope and mtr., $250
Tilt. arbor saw, Wallace No. 8, M.D., $110
Variety saw, heavy duty, with jointer, MD., $175
Variety saw, heavy, tilting arbor, Fairbanks, $175
Numerous other machines

FOR SALE

Clifton Machinery Co.
1623 W. 6th St. Cincinnati, Ohio

Saw Dust and Shavings Mill Exhausters and Blowers—Hundreds in stock, sizes to suit any need. Also Air Compressors, Fans, Rotary Blowers, Money Savers—Send specifications.

All machines rebuilt and fully guaranteed.

FOR SALE

L. R. Kenner
3325 Trinity Road Louisville 6, Ky.

Borer, 48" Bell No. 205 horiz. multiple head
Planer, 30" Whitney sgle. sq. head, with motor
Sander, 48" Smith No. 404 end. bed, BB, M.D.
Cut-off Saw, Diehl No. 88 Str. Line

FOR SALE

Address replies to Box 191
c/o WOOD WORKING DIGEST
Wheaton, Illinois

New Hawker Dowel Knives @ $14.95 per set. Mattison Lathe Parts. T-Slot Cylinders and Hangers, One Half Price.

CYCLONES

65" Day—Like New $200
70" Day—Like New $250
84" Top Inlet—Good Condition $300

EXHAUST FANS

HARRIS MACHINERY COMPANY
501 30th Ave. S.E., Minneapolis 14, Minn.

USED AND REBUILT MACHINES
PRICED FOR QUICK SALE FROM STOCK

JOINTERS—20" No. 1 American, ball bearing
24" American Bilstrom Swingout Feeder
30" American Swingout Feeder
12" H. B. Smith direct motor drive

MORTISERS— New Britain Chain No. 7
Greenlee No. 228 C.M.D. front motor

TENONERS—Fay & Egan No. 2 coupled drive motor upper-lower copes & C.O. 3 HP
Jenkins Model No. 95 Double Bed
Jenkins Model No. 90 Double Bed

LATHE—Mattison No. 57-B 42" with standard and hollow chuck feed

MOULDERS—Fay & Egan No. 226-4"
Childs 2"x4" Electric Moulder
Yates No. 108—10" 4-side moulder with 50 HP motor
Fay & Egan No. 209 ball bearing moulder

SURFACERS—Whitney No. 105—24" DMD with variable feed
30" No. 156 Fay & Egan ball bearing
No. 490 Fay & Egan 24" single
30" No. 340 Fay & Egan
30" No. 32D Smith ball bearing single
24" Whitney Double Cabinet Type

SHAPERS—No. 2½ American ball bearing, double spindle DMD with freq. changer

BAND SAWS—36" No. 186 Ball Bearing Hall & Brown
30" No. 155 ball bearing v-belted drive Fay & Egan

RADIAL SAWS— Multiplex 5 HP radial saws, radial arm ball bearing

CUT-OFF SAWS—No. 452 Greenlee Auto.

RIP SAWS—Root Self Feed

VARIETY SAWS—Tannewitz tilt-table
Smith Model 338 ball bearing

SWING SAWS—Holmes 3 HP motor
Eaglesfield ball bearing DMD

SANDERS—Mattison Hand Block Belt, 5 HP motor

SHAVING EXHAUSTERS—Buffalo double, Tandem drive, 30"

SPECIAL—Porter 24" Jointer Facer-Buss No. 4 30", 8 Roll Double Surfacer Unit

WILL PAY CASH FOR
Single Machine or Entire Plant. All makes, models, sizes
Write, wire or phone Today!
FAY & EGAN CO. • Tele. PL-0730
2023 Eastern Ave., Cincinnati 2, Ohio
Factory Rebuilt Machines

Bell No. 12 Air Operated Double Mitre
Greenlee No. 495 Tilt-Arbor Variety Saw
Greenlee No. 338 Vert. Gang Borer 15 HP
Mattison Late Style 12" Electric Moulder.
Diehl-Vonnegut 12" Electric Moulder-latest.

COME TO CHATTANOOGA AND INSPECT

R. K. HASKEW & CO., INC.
CHATTANOOGA, TENN.
Phone 6-6214

Yates-Am. A-20, 15x8 P & M Double Profile.
Yates-Am. V-54 54" Band Resaw, B.B.
Yates-Am. A-66, 15x6 SK Ro hds. Belt Dr. B.B.
Diehl-Von 12" Electric Moulder, 3½ yrs. old.
Diehl No. 55 Straight Line Ripsaw 440/60/3
Diehl No. 666 Continuous Feed Glue Jointer.
Mattison 202 Straight Line Ripsaw, 15 HP.
Newman 500 16x8 Planer with Top Profile.
Newman 111 16x8 Planer with Bottom Profile.
Wilk.-Chal. No. 70 Elec. dbl. End Tenoner-Tilts.
Jenkins 96 Belt & Electric D E Tenoner & Copes.
American 11 Electric Double Cut Off & Copes.
Hermance 36 Straight Line Ripsaw-Electric.
Hermance 300G Gang Roll Feed, Motor on Arbor.
Smithway X-L 4" Electric Moulder. Extra Heads.
Vance 66, 15", Four Side, B.B. Planer.

R. K. HASKEW & CO., INC.
Chattanooga 5, Tennessee

BETTER PAY DAYS for YOU

LEARN
FURNITURE PRODUCTION
AT HOME . SPARE TIME!

There is great demand for efficient production men. Now you can learn quickly Time Study, Cost, Production Scheduling by the famous Klok Institute method. Klok Graduates get and hold top positions. Write for free booklet, no obligation, of course.

FREE BOOKLET GIVES FULL INFORMATION

KLOK INSTITUTE (Established 1929)
154 Louis St., N.W.
Grand Rapids 2, Michigan

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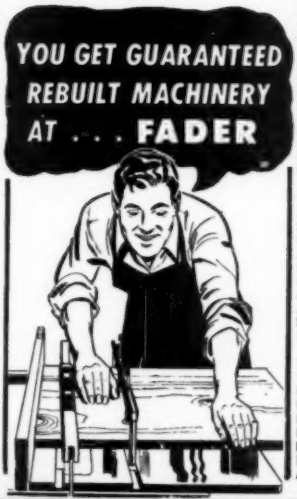

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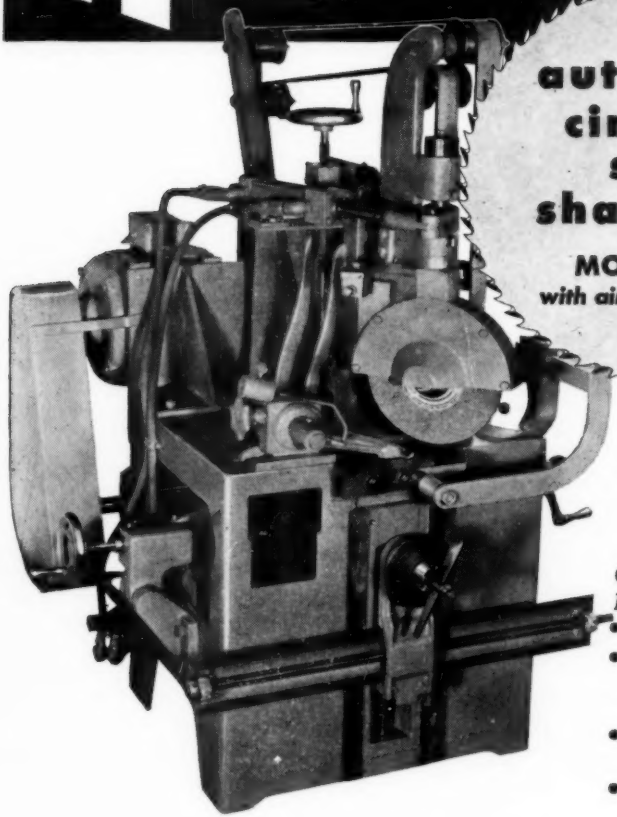

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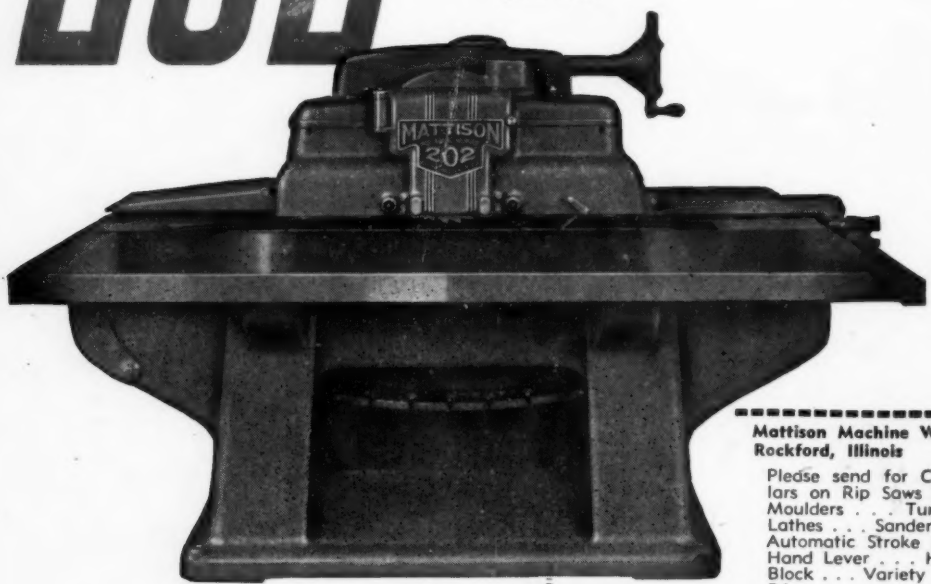

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